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ABSTRACT

This paper describes the organizing and purpose of a conference on curriculum, instruction, and assessment in the middle grades that focused on higher achievement for all adolescents, especially those who are poor. The paper also contains a synthesis of the conference presentations and recommendations for policy and practice. Approximately 200 researchers and educators participated in the conference. A summary of conference strands describes keynote addresses and other papers related to the state of middle grades achievement, the state of literacy, the state of mathematics, and the state of professional development. Themes and recommendations are summarized for literacy, mathematics, and professional development. The document also contains papers commissions for the conference: (1) "Where Are We Now? Taking Stock of Middle Grades Education" (Kati Haycock and Nancy Ames); (2) "Grappling with the Big Issues in Middle Grades Literacy Education" (Donna E. Alvermann); (3) "Mathematics in the Middle Grades: Linking Research and Practice" (Judith Sower); and (4) "Teachers' Professional Development for Vital Middle Schools: What Do We Know and Where Should We Go?" (Karen Seashore Louis). An appendix provides presenter biographies. Each paper contains references. (Contains 1 table and 41 figures.) (SLD)

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National Conference on Curriculum, Instruction, and Assessment in the Middle Grades:

Linking Research and Practice

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PROCEEDINGS

July 24-25, 2000

Sponsored by the
National Educational Research Policy and Priorities Board
U.S. Department of Education

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July 24, 2000

Dear Conference Participant:

On behalf of the National Educational Research Policy and Priorities Board and the U.S. Department of Education, I would like to welcome you to this conference on *Curriculum, Instruction, and Assessment in the Middle Grades: Linking Research and Practice.*

The goal of the conference is to learn about successful research-based interventions and practices in middle-grades education so that we can foster higher achievement for all adolescents, especially those who are poor. The conference will give particular emphasis to literacy, mathematics, and teacher professional development, since these are the foundation of all formal learning. In addition, our sessions will elicit and identify areas for further research and development in this field, which has in the past perhaps over-emphasized the social domain to the detriment of the academic.

The Board wishes to thank all who have contributed to the conceptualization of this conference, notably Education Development Center, Inc. of Newton, MA, and our conference contractor, EduTech Limited, Inc. of Silver Spring, MD. We are particularly indebted to Eve M. Bither, our former executive director, for her steadfast support for strengthening the middle school curriculum.

Sincerely,

Kenji Hakuta

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CONFERENCE SUMMARY

INTRODUCTION

On July 24–25, 2000, the National Educational Research Policy and Priorities Board (the Board) convened a group of researchers, policymakers, and practitioners to share the latest research and craft knowledge on what works in helping young adolescents meet high academic standards. Participants were charged with identifying concrete suggestions for future research, policy, and practice. This paper describes the organizing and purpose of the conference; its organizing questions; a synthesis of the conference presentations; and recommendations for policy and practice.

Origins of the Conference

The conference grew out of the work of the Board, which was established by the Educational Research, Development, Dissemination and Improvement Act of 1994. The Board's primary focus is to promote research that leads to higher achievement for all students, especially those who are poor. Of particular concern to the current Board is accelerating student performance in language arts and mathematics.

The Board's major responsibilities include the following:

- ★ Working collaboratively with the Assistant Secretary to determine priorities to guide the work of OERI.
- ★ Providing recommendations for translating research findings into adaptable models for use in policy and practice across different settings.

To assist the Board in developing research priorities that carry out this agenda, the Board contracted with the National Academy of Education (NAE) to develop a set of recommendations on research priorities and specific research questions in each priority area. NAE identified three focus areas:

- ★ Critical transitions in the lives of students.
- ★ Teacher professional development.
- ★ Expanding the link between research and practice.

This conference addressed the Board's research priority in the area of critical transitions by linking educational research and the practice of schooling in a critical transitional period in the lives of students: the middle grades.

The conference built on an earlier Office of Educational Research and Improvement (OERI) Conference on Early Adolescence that was held in May 1998. That conference brought together about 40 researchers, policy makers, and practitioners to address critical issues in serving young adolescents. Five papers were developed for that conference, which resulted in a set of broad recommendations for policy, research, and practice. These recommendations covered several areas including school size and structure; parent/community involvement; youth development; and curriculum, instruction, and assessment.

Broad recommendations can serve an important purpose in setting a context for work that needs to be done. However, without additional focus, they rarely affect practice. What the Board wanted now was a more in depth look at the Board's priorities, with specific recommendations generated for researchers, practitioners, and policy makers. To this end, this conference focused almost exclusively on curriculum, instruction, and assessment.

The Importance of Early Adolescence

Researchers and educators have come to view early adolescence as a unique period of development in all domains — cognitive, social-emotional, and physical (Ames & Miller, 1994). Young adolescents are living through some of the most important and drastic changes in the entire life cycle.

For years, scholars have documented the developmental challenges of this stage of development. Recent brain research reveals that during the teen years up to age 15, the areas in the middle and back of the brain associated with associative thinking and language reach their peak growth rates. During these years, schools can play a critical role in helping young adolescents develop a positive self-image and the skills they need to deal with the enormous new pressures they face. The way in which curriculum is organized and instruction is delivered — as well as the manner in which schools are organized and function—can have an important impact on students' academic growth and personal development. There is a need to combine knowledge about early adolescent development with educational practices that enhance learning and achievement.

While many schools have embarked on reform efforts to take into account middle grade's students' unique strengths and challenges, there is still much to be done. As Urdan and Klein (1998) point out, in many middle-level schools a disjunction exists between the teaching methods and materials and the cognitive developmental advances, learning preferences, social development, and rapid physical changes that occur during early adolescence. Ames (1999) draws attention to a similar disconnect that exists between the new type of instruction called for in national standards documents and the type of instruction that is found in many middle grades classrooms.

Moreover, there is an urgent need to make changes in middle grades schools and classrooms now. According to the 1998 National Assessment of Educational Progress (NAEP), 62 percent of fourth graders, 74 percent of eighth graders, and 77 percent of twelfth graders did not reach proficiency levels in reading. The numbers look similarly bleak in writing with 77 percent of fourth graders, 73 percent of eighth graders, and 78 percent of twelfth graders performing below proficiency. Furthermore, the NAEP 1996 Trends in Academic Progress report shows that little to no gains have been made in reading scores since 1973. Likewise, writing scores have not shown significant changes, with the exception of eleventh graders whose overall performance declined.

The complex issues associated with early adolescence suggest a vision for research and practice that takes into account the complex interplay between students, curriculum, and instruction, human resources, and environmental contexts. The purpose of this conference was to identify what we know from research and craft knowledge about how to chart a course for significantly enhancing the achievement of middle grades students, particularly those who are most at risk due to poverty and other factors. It was also to define the research questions we still need to answer.

About the Conference

The Board convened approximately 200 researchers, practitioners and policymakers, including Department of Education and other federal staff, legislative leaders and foundation representatives for the purposes of sharing the latest research and craft knowledge on what works in helping young adolescents meet high academic standards. The ultimate goal of the conference was to identify concrete suggestions for future research, policy, and practice. Secondary goals included:

- ★ Capturing the attention of policy makers about middle-level education and giving them the knowledge and tools they need to take appropriate action.
- ★ Informing those practitioners who are ready for action about the latest research and knowledge of best practice.

- ★ Strengthening links between the research, policy, and practice communities.
- ★ Expanding the network of those committed to middle grades reform and providing members with the knowledge and skills they need to exercise greater leadership.

The conference was organized around four essential questions (see agenda below):

1. What do we know about student achievement in the middle grades?
2. What curriculum, instruction, assessment, and environmental factors support middle grades students' literacy development?
3. What curriculum, instruction, assessment, and environmental factors support middle grades students' development in mathematics?
4. What kinds of professional development and organizational support improve teaching and learning in language arts and mathematics?

The conference began with an initial welcome and context setting. The format for the remainder of the conference involved a plenary presentation, followed immediately by a panel response and moderated commentary involving audience participation. Following this plenary session were five concurrent sessions that explored the essential questions in more depth, drawing on both research findings and best practice. The final session on Day 2 involved discussion of policy and research recommendations.

National Conference on Curriculum, Instruction, and Assessment in the Middle Grades:
Linking Research and Practice

Agenda

July 24-25, 2000 ★ Renaissance Washington DC Hotel ★ Washington, DC

A Conference Sponsored by:
The National Educational Research Policy and Priorities Board (NERPPB)
The U.S. Department of Education

Monday, July 24, 2000

7:30 a.m. **Registration and Continental Breakfast**

8:30 a.m. **Plenary Session:** Welcome and Overview
Kenji Hakuta, Chair, National Educational Research, Policy and Priorities Board
C. Kent McGuire, Assistant Secretary, Office of Educational Research and Improvement

Conference Overview
Judith Zorfass, Education Development Center, Inc.

9:00 a.m. **Plenary Session**: Keynote Address

Introduction: Joan Lipsitz, National Forum to Accelerate Middle Grades Reform

Where Are We Now? What Is the Challenge for Middle Grades Education?
Kati Haycock, The Education Trust and Nancy Ames, Education Development Center, Inc.

Presented by Nancy Ames

This keynote reviews national data on the results and processes of middle grades education: a summary of results over time; practices associated with improved results; and case studies of schools.

Response:
James E. Bottoms, Southern Regional Education Board, and Hayes Mizell, Edna McConnell Clark Foundation

Moderated Q & A

10:30 a.m. **Break**

10:45 a.m. **Concurrent Sessions**

It's a Difference that Changes Us: An Alternative View of the Language and Literacy Learning Needs of Latino Students
Robert Jiménez, University of Illinois

This research examines how literacy and identity interacted in the development of students in four bilingual classrooms, and how these students conceptualized the roles that English and Spanish literacy played in their lives.

Mathematics: Caught in the Middle
Thomas A. Romberg, University of Wisconsin-Madison

This presentation shows how middle schools, students, teachers, and mathematics are all, for different reasons, "caught in the middle." It looks at the historical context of mathematics

instruction, teacher preparation, and assessment; the challenges of standards-based reform and accountability; the need for staff development; and results that guide practice and identify key resources.

Middle School: New Opportunities or Dead Ends
Gloria Ladson-Billings, University of Wisconsin-Madison

This session presents a conceptual framework necessary for successful teaching of middle-level students. Issues of academic achievement, cultural competence, and socio-political consciousness will be explained and illustrated as a rubric for effective middle-level teaching.

Teaching Middle Schoolers in a Writing Workshop Approach
Nancie Atwell, Center for Teaching and Learning

This session will demonstrate how middle school students learn to write with clarity, logic, and passion in a writing workshop. The students draft, revise, edit, and publish their writing for audiences within and beyond the classroom. Ms. Atwell will discuss her roles in the workshop as instructor, responder, and collaborator.

12:00- 1:00 Lunch and Reflection (Lunch provided)

1:00 p.m. **Plenary Session: Literacy**
Introduction: Nancy Doda, National-Louis University

Grappling with the Big Issues in Middle Grades Literacy Education
Donna Alvermann, University of Georgia

This session will examine several timely issues in middle grades literacy education, what research has to say about them, and the implications of this research.

Response:
Leah Meyer Austin, W.K. Kellogg Foundation, and
Lea Schelke, Trenton High School (Trenton, MI)

Moderated Q and A

2:30 p.m. **Break**

2:45 p.m. **Concurrent Sessions**

Designing Questions toward Thinking and Understanding
Margaret McKeown, Learning Research and Development Center, University of Pittsburgh

This session deals with the kinds of questions usually asked in classrooms and suggests how designing questions that promote thinking and understanding rather than eliciting "right answers" could improve the dialogue in classrooms.

Reversing Reading Failure in At-Risk Youth
Mary E. Curtis, Lesley College

This session explores the reading strengths and needs of at-risk adolescents; methods and materials effective in improving reading skills; and the factors that promote reading improvement.

Standards-Based, Results-Driven Professional Development
Stephanie Hirsh, National Staff Development Council

This session will discuss the basics of standards based, results-driven professional development for teachers, administrators, and other school system personnel, and issues that arise in its implementation

4:00 p.m. **Adjourn**

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TUESDAY, JULY 25, 2000

7:30 a.m. **Registration and Continental Breakfast**

8:00 a.m. **Welcome**: Nancy Ames, Education Development Center, Inc.

Overview: Judith Zorfass, Education Development Center, Inc.

8:15 a.m. **Plenary Session: Mathematics**

Introduction: Robert Marley, Wichita State University

Mathematics in the Middle Grades: Linking Research and Practice
Judith Sowder, San Diego State University

This presentation discusses what we can reasonably expect from research; issues concerning middle school mathematics curriculum; and links from research into practice.

Response:
Glenda Lappan, Michigan State University, and Terri Mozingo, Charlotte-Mecklenburg Schools

Moderated Q and A

9:30 a.m. **Break**

9:45 a.m. **Concurrent Sessions**

NCTM's Principles and Standards for School Mathematics: Overview and Implications
Joan Ferrini-Mundy, Michigan State University

This session will provide an overview of the key features of Principles and Standards for School Mathematics as well as its relations to previous Standards documents. Implications for various groups invested in mathematics education will be discussed.

Achieving Systemic Middle School Change in Mathematics
Diane Briars, Pittsburgh Public Schools

This session will examine efforts by the Pittsburgh Public Schools and other urban districts to institute systemic reform in middle school mathematics. Student achievement data, key implementation issues, and their implications for future systemic reform efforts will be presented.

Recent Progress in the Teaching of Critical Topics in Middle Grades Mathematics
James Fey, University of Maryland

Standards-based middle school curricula have drawn on recent research in mathematics education to produce curriculum materials, teaching strategies, and assessment practices that promise radical change from traditions of U.S. mathematics education. Core middle grades topics like measure, proportionality, and algebra are now being taught with considerable success using new curriculum structures and classroom learning environments. This session will describe and illustrate some of the key innovations.

Closing the Achievement Gap: An Asset-Based Approach to Urban Restructuring
Belinda Williams, University of Pennsylvania

Despite the reform efforts of the 1990's, a large gap separates the academic performance of urban and suburban students. Recent research and theory have identified conditions (cultural environments, current understandings of intelligence, resilience, etc.) that affect success in urban schools. This interactive session will examine these conditions, an emerging vision, and implementation strategies supported by recent research.

11:00 a.m. **Plenary Session: Professional Development**

Introduction: Ann B. Clark, Vance High School, Charlotte-Mecklenburg Schools

School Systems and Professional Development for the Middle Years
Karen Seashore-Louis, University of Minnesota

This presentation argues that we know a good deal about effective professional development for middle schools, but that our knowledge is incomplete. In order to move forward, educators must adopt an approach to professional development which is integrated with school change models, and which assumes that many types of professional development must coexist in a turbulent change environment.

Response:
Patrick Montesano, Academy for Educational Development, and
Ken McEwin, Appalachian State University

Moderated Q and A

12:15 p.m. **Lunch and Reflection** (Box Lunch Provided)

1:15 p.m. **Concurrent Sessions**

A Research Agenda to Support Improved Academic Achievement in High Poverty Schools
Joseph Johnson, University of Texas-Austin

This session will explore what has been learned about highly successful high poverty schools and how to help low performing schools improve.

How We Can Create Whole School Environments to Support Literacy Development of Diverse Students
Catherine Cobb Morocco and Nancy Clark-Chiarelli, Education Development Center, Inc., with Sharonica Hardin, Colleen Peters, and Andrea Walker, Compton-Drew Middle School (St. Louis, MO)

Compton-Drew Investigative Learning Center, a middle school in the St. Louis, Missouri, Public Schools, draws on the philosophy of research-based Schools for Thought. Compton-Drew English/Language Arts teachers will share two literacy practices, cross-talk and independent pod work, which structure learning in every content area and give every student a voice as they work together to understand how texts such as folktales convey messages about a culture.

Baby Steps and Slight Nudges Can Move Mountains – How to Accomplish School-wide Change
Michelle Pedigo, Barren County Middle School (Glasgow, KY)

School-wide change is difficult and takes time to accomplish. This session provides stories from real schools about continuous staff improvement through professional development.

Lessons Learned: Leadership Development that Fosters Shared Leadership and Results
Susan E. Galletti, GALEF Institute

When the learning community of adults in a school is strengthened, both teaching and leadership improve. Participate in a discussion of best practices in professional development.

2:30 p.m.	**Concurrent Sessions: Implications for Future**
	Research, Policy and Practice
	Implications for Literacy
	Implications for Mathematics
	Implications for Professional Development
3:30 p.m.	**Adjourn**

Summary of Conference Strands

This section synthesizes information from the National Conference on Curriculum, Instruction, and Assessment in the Middle Grades: Linking Research and Practice. The summary is divided into the following sections: the state of middle grades achievement, the state of literacy, the state of mathematics, and the state of professional development. In each section we follow the same format. We begin with a summary of the keynote or plenary presentation, follow with highlights of respondents' comments, and end with summaries of the related concurrent sessions.

The State of Middle Grades Achievement

Where Are We Now? What is the Challenge for Middle Grades Education?
Kati Haycock, The Education Trust
Nancy Ames, Education Development Center, Inc.

Respondents
Gene Bottoms, Southern Regional Education Board
Hayes Mizell, Edna McConnell Clark Foundation

Related Concurrent Sessions
Middle School: New Opportunities or Dead Ends
Gloria Ladson-Billings, University of Wisconsin-Madison

A Research Agenda to Support Improved Academic Achievement in High Poverty Schools
Joseph Johnson, Jr., University of Texas, Austin

Closing the Achievement Gap: An Asset-Based Approach to Urban Restructuring
Belinda Williams, University of Pennsylvania

Keynote

Students in the middle grades are not meeting the standards of performance expected of them, according to national and international assessments of educational progress. A combination of factors including low expectations, watered-down curriculum, inadequately prepared teachers, and inadequate resources have prevented many young students from learning to use their minds well. To date, reforms at the middle level have not produced more growth in student learning, concluded Kati Haycock and Nancy Ames.

Data from the National Assessment of Educational Progress (NAEP) show that students completing middle grades education today know somewhat more in core academic subject areas than their predecessors did in the 70s. By the end of the 90s, however, less than 40 percent of all students reach the proficient level in any academic subject. Moreover, patterns of achievement differ across subjects, as well as among students of different racial and economic backgrounds. Middle grades students made cumulative advances in mathematics through all the decades. While they made gains in reading during the 70s, their scores remained stable during the 80s and 90s. And, their performance in science has been inconsistent over time — down in the 70s, up in the 80s, and then down again in the 90s. When the data over time are disaggregated by race, the authors noted that the pattern is clear: while the achievement gap between whites and minority students narrowed in the 70s and early 80s, it widened again in the 90s.

The authors attributed much of the increase in middle grades student performance over the last three decades

to improvements in elementary education. That is, when one takes into account the gains made by students in the earlier grades, the "value added" in grades 5-8 has declined over time in mathematics, remained stable in reading, and declined in science. Thus, virtually all of the growth in eighth-grade achievement, where it exists, is due to better preparation in grade 4 and below. These data are consistent when disaggregated by race.

Data from the Third International Mathematics and Science Study show that international comparisons are equally discouraging. When compared to students in other countries, American students do relatively well in reading and mathematics at grade 4. In fact, they are near the top in science, and they are in the upper middle tier in mathematics. By eighth grade, however, their relative position has fallen rather dramatically. While American student performance improves from grades 5 through 8, student improvement in other countries is considerably more.

Using data from a variety of sources, the authors described the factors that appear to be associated with higher student achievement. These include rigorous curriculum, challenging lessons and assignments, well-educated teachers, and adequate instructional resources. In a review of which students are most likely to have the opportunity to learn, the patterns are consistent across all subjects and grades. Poor students, minority students, and lower-achieving students of all races are far more likely than other students to receive a watered-down curriculum, less qualified teachers, and inadequate resources.

Haycock and Ames concluded: despite the fact that middle grades students are exiting eighth grade with somewhat higher skills, many are trapped without the skills necessary for high school success, and perform well below their counterparts in other nations. The problem is exacerbated for students from poor families, students of color, students with disabilities, and other students who are traditionally overlooked in our nation's schools. Unless we work hard to improve middle-level education, especially for those who are most at risk of educational failure, we will be limiting the future life and career options of another generation of young people.

Pockets of excellence, however, exist in districts throughout the country. In several states, districts, and schools across the country, administrators, staff, and parents are working together to provide young adolescents with the kind of schooling they will need for success in the 21st century. These schools have benefited from the middle grades reform movement that began in the 70s and gained increased momentum in the 80s and 90s. The National Forum to Accelerate Middle Grades Reform is one example of the movement's thriving activity. The 43 leaders of the National Forum have adopted a shared vision of high-performing middle grades schools that are academically excellent, developmentally responsive, and socially equitable. Forum members are working together to make that vision a reality in many more schools across the country (for more information on the National Forum, see *http://www.mgforum.org*).

Haycock and Ames cited data from North Carolina, Texas, and Kentucky to show how students in grades 6-8 can make significant progress when states adopt and implement reform policies such as

- ★ Setting statewide academic standards by grade level for clear teaching objectives;
- ★ Holding all students to the same high standards;
- ★ Conducting statewide assessments closely linked to the academic standards;
- ★ Creating accountability systems with clear consequences for results;
- ★ Increasing local flexibility for administrators and teachers in meeting the standards;
- ★ Computerized feedback systems, including data for continuous improvement;
- ★ Shifting resources to schools with more disadvantaged students;
- ★ Creating an infrastructure for reform (Grissmer and Flanagan, 1998).

Increased student achievement is also evident in major middle grades initiatives funded by the Edna McConnell Clark Foundation, W.K. Kellogg Foundation, and Carnegie Corporation. These initiatives share a common goal of improving the educational programs and learning environments for the most vulnerable middle grades students. In addition, they each seek to promote comprehensive school improvement by using data to inform decision-making, building a strong learning community, and forming partnerships with families and community members. With sustained funding and ongoing technical assistance, schools in all three initiatives have demonstrated significant improvements in school organization and culture, classroom practice, and student performance. Of course, the more these schools implement the key features of effective middle grades schools, the better their student outcomes.

Finally, Haycock and Ames described what high-performing middle grades schools look like in practice, drawing upon case studies prepared by the National Forum's Schools to Watch (STW) Committee and the Beacons of Excellence project.[1] After a lengthy nomination, application, and selection process, the four STW and the three Beacons schools were chosen by their respective research teams because they met the National Forum's criteria for high-performing middle grades schools. That is, each school had made significant progress in all three areas: academic excellence, developmental responsiveness, and social equity. In addition, each school had created the infrastructure necessary to support continuous improvement over time. The authors provided brief vignettes from all seven of these middle grades schools organized around the following topics:

- ★ A shared vision or philosophy;
- ★ High expectations for all students;
- ★ Challenging and engaging curriculum and instruction;
- ★ A focus on accountability;
- ★ Intensive and ongoing professional development;
- ★ Support for students at risk of educational failure;
- ★ Active family/community involvement;
- ★ Strong instructional leadership.

Respondents

Following the Haycock and Ames presentation, Gene Bottoms identified four issues raised by the paper:

- ★ *The mission of middle grades education is not clear.* Focusing on the developmental needs of young adolescents has become an excuse not to figure out how to teach all students using a rigorous curriculum. A greater effort must be made to give all students an opportunity to pursue a college preparatory program in high school. This effort should be led by school principals who encourage their teachers to revise the curriculum and figure out how to teach more rigorous content to their students.
- ★ *We need to strengthen teacher certification requirements and in-service training.* Many middle grades teachers hold an elementary or a general education certificate. Middle-level teachers are also less likely to have had in-depth subject area preparation. A greater effort needs to be made to provide in-service training focused on content knowledge.
- ★ *The majority of teachers in the middle grades continue to emphasize lower-level academic tasks in their lessons.* Teachers who have students in lower academic tracks often have low expectations for what their students can accomplish.

---

[1] The Beacon of Excellence project is a three-year research project being conducted by the Education Development Center, Inc., with funding from the U.S. Department of Education, Office of Special Education Programs. Its goal is to identify and describe high-performing urban middle grades schools that successfully include students with disabilities in the general education program.

★ *A large resource allocation gap exists between education in the middle grades and other grade levels.* We need to understand and help communicate to policymakers why fewer dollars are spent per student at this level.

Bottoms also remarked that schools must pay more attention to connections with families and the communities. The support provided by these two groups can be the key to success in meeting the school's instructional goals. Schools must also explore ways to utilize time better during and outside the school day.

In his response, Hayes Mizell highlighted two challenges to the progress of middle grades reform. The first challenge is the deep disagreement among educators about the purpose and desired results of middle-level education. One faction believes that middle grades teachers and administrators should provide students with safe and supportive learning environments, and then "hope for the best" academically. Another faction has little regard for students' personal development, believing that students in the middle grades should transition into an adult-centered environment and learn to respond to adults' preferred methods of instruction. Until more schools adopt a vision that captures the interaction between students' personal and intellectual development, educators will not have the consensus of conviction and action necessary to significantly improve student learning.

The second challenge is that, while much is known about practices that are effective in increasing student achievement, very few educators are seeking out and using this readily available knowledge. Teachers and administrators are not the only groups who are not taking the initiative to find, learn, and apply these effective practices. For example, by promoting sloppy staff development programs, school boards, superintendents, key central office staff, and teacher unions communicate their lack of interest in changing the current state of knowledge and practice. Many districts send out an implicit message that participation in these programs is not expected to result in academic benefits for students. We need to examine the reasons why middle-level educators are not using what is already known about practices that increase student learning. Until these two problems are addressed, the focus of middle grades education will continue to be on the challenges rather than on the accomplishments.

Related Concurrent Sessions

In her concurrent session, Belinda Williams noted that reading and mathematics scores in both poor and higher income schools improved from 1992 to 1999, coinciding with the introduction of standards. Yet the achievement gap between poor and high-income students remains, and is actually widening. Williams recommended that researchers examine the factors that contribute to this gap. Otherwise, a lot of resources, time, and money will continue to be spent on standards, even though there is no real evidence that they are making a difference for students from low-income families.

Our policies thus far contribute to the development of a permanent underclass of people, Williams argued. We need to move beyond our current approach to "educating all children," which usually means regular education, remediation, or special education. Once students are removed from the regular education classroom, they don't receive the same curriculum. We need to give teachers the training they need to understand why these children are not succeeding in the regular classroom and the instructional strategies that improve learning for all in the regular classroom. Furthermore, to close the gap, we must:

★ *Broaden our theoretical understanding of all human development and learning* drawing upon the latest information from at least three areas: biology, psychology, and sociology. Of critical importance is an understanding of the culturally diverse environments from which our children come.

★ *Change the system* of education in this country, not just add a few programs.

★ *Engage in more comprehensive planning* to change the system and structure of education, including teacher preparation, so that they address all the complexities of human development.

- ★ *Engage in whole-school reform*, an approach that has demonstrated success in closing the achievement gap.
- ★ *Know the learner* and provide the resources and opportunities to make connections, which we all know is the most powerful way for learning to occur.
- ★ *Examine the research on resilience* in order to find out what factors strengthen outcomes for socio-economically disadvantaged people.
- ★ *Redefine outcomes.* If we aim to prepare citizens to be competitive in society, our reform goals must focus beyond the school and academic performance.

Gloria Ladson-Billings pointed to data that show we are not getting much "bang for the buck" in urban middle schools, where a lot of students are not doing well. She suggested taking a look at the students who have traditionally struggled, finding where schools are doing a good job, and sharing that information to help everybody. Ladson-Billings' research focuses primarily on African-American boys, who seem to be doing worse than anybody else. She suspects that if we find out how to help these students, we can probably help others as well.

Rather than focusing on the fallacy of "raging hormones," Gladson-Billings believes that educators must understand young adolescents as complex human beings with social, cultural, and intellectual dimensions. She argues that every student must be known well by at least one adult in the school environment and that every student should also acquire a functional body of knowledge. Effective middle schools, therefore, include a comprehensive curriculum plan and an advisory team.

In a positive learning environment, the teacher presumes the educability of all children and clearly delineates what students should know and be able to do. The teacher knows the lesson content, the learner, and how to teach the content to the learner. The teacher considers academic achievement a complex notion, not measurable by a single, static gauge. Rather than "just managing bodies," the teacher must (1) understand culture and its role in education; (2) take responsibility for learning about the students, the culture, and the community; and (3) use students' culture as a basis for learning at the local, national, and global level.

Often young African-American students feel that they must choose between being good students and being themselves. Disengagement from school actually raises their status among their peers. African-American females may define themselves purely in sexual terms. Some African-American students who are gifted and do well in school do so at great cost, including derision and isolation from friends. To help these students, teachers need to know the larger socio-political context of the school and the community and plan academic experiences that connect them to the larger community. While they must be passionate about content, they must also take student diversity and individual differences into account.

Joseph Johnson described research conducted by the Charles A. Dana Center, which focuses on improving education in high poverty schools in Texas. Schools in the study had high concentrations of students eligible for free or subsidized lunches who were also successful on the state tests. In examining these schools, the researchers focused on how schools fared with specific groups such as children with disabilities and children whose first language was not English. Johnson's findings mirror those in the Haycock and Ames presentation:

- ★ *Successful middle schools aim for clear, challenging academic goals.* The successful schools could articulate and set precise goals that necessitated a stretch on the part of students and teachers. A strong vision-driven principal who has the support of others is key.
- ★ *Successful middle schools have a "no excuses" attitude.* Low-performing schools present many excuses that have nothing to do with instruction. Educators at successful schools assume that all students can achieve at very high levels. They use state-level assessments, disaggregated by type of student, to help understand and improve teaching.

- ★ *Successful middle schools focus on improving instruction.* Teachers at these schools constantly monitor their own teaching and strive to make it better. They also focus on improving learning beyond what is necessary for the students to pass the state tests. They encourage collaboration and trust among teachers, allowing teachers to learn from each other, continue to improve, and support each other. Educators in these schools persist through difficulties and are resilient in the face of obstacles and challenges.
- ★ *Successful middle schools also make students, parents, and educators feel valued.* These schools not only create a positive environment within the school, they also recognize the importance of engaging parents in the school program. Johnson told of one principal who went to students' homes, knocked on doors, and began by telling the parents how happy he was to have their children in his school. This led to greater parental involvement, which was a factor in the school's success.

The State of Literacy

Grappling with the Big Issues in Middle Grades Literacy Education
Donna Alvermann, University of Georgia

Respondents
Leah Meyer Austin, The W.K. Kellogg Foundation
Lea Schelke, Trenton High School

Related Concurrent Sessions
Designing Questions Toward Thinking and Understanding
Margaret McKeown, Learning Research and Development Center

It's a Difference that Changes Us: An Alternative View of the Language and Literacy Learning Needs of Latino Students
Robert Jiménez, University of Illinois

Reversing Reading Failure in At-Risk Youth
Mary E. Curtis, Lesley College

Teaching Middle Schoolers in a Writing Workshop Approach
Nancie Atwell, Center for Teaching and Learning

How We Can Create Whole-School Environments to Support Literacy Development of Diverse Students
Catherine Cobb Morocco and Nancy Clark-Chiarelli, Education Development Center; Sharonica Hardin, Colleen Peters, and Andrea Walker, Compton-Drew Middle School

Plenary Session

Donna Alvermann identified four key issues in middle grades literacy education that practitioners, researchers, and policymakers are grappling with today:

- ★ Concern for the young adolescent who struggles with reading. They struggle for different reasons and are given a plethora of labels (e.g., learning disabled, second language learners, "at-risk," unmotivated, disenchanted).
- ★ The perceived need to accelerate students' reading achievement and academic learning in the subject matter areas, such as social studies, science, and English language arts.
- ★ The potential for using adolescents' out-of-school interests in computers and the media to foster their in-school subject learning.
- ★ Concerns about whether the knowledge base in middle grades literacy education is being translated into practice.

After identifying these issues, Donna Alvermann discussed what research says and does not say with respect to these four areas.

Readers who struggle: Focusing on second language readers and monolingual, unsuccessful readers who struggle, she noted that research on these two types of readers generally explain the struggle in three ways:

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- ★ The deprivation approach assumes that there is a stable set of tasks, deemed milestones by a particular culture, to which all its members must respond if they are to qualify as developmentally competent on those tasks. For example, being able to decode, comprehend, and summarize large chunks of informational texts would qualify as one such set of tasks in the middle grades. Students' below-average performances on these tasks are taken as evidence that these students have not yet developed the requisite set of skills necessary for reading competently at a particular grade level or in a particular set of texts. Regardless of where the research is carried out, the findings are remarkably similar. While the instructional intervention is in progress, students who are struggling with reading show marked improvement in reading performance and their self-esteem also improves. What the research does not tell us is whether these changes are long lasting and transfer to situations beyond the research setting or specific subject matter area under investigation.
- ★ In the difference approach, the ways in which young adolescents develop competencies as literate beings will vary according to the demands of their particular cultures. Although there is some research (e.g., Brozo, Valerio, & Salazar, 2000) to suggest that bilingual middle grades students can benefit from literacy instruction that takes into account their cultural funds of knowledge, much more work needs to be done in this area.
- ★ The culture-as-disability approach assumes that all cultures teach people about what is worth working for, how to succeed, and who will fall short. Using the culture-as-disability approach to understanding struggling readers in the middle grades, one might argue that the school curriculum disables some students by mandating what is assumed to be a stable (though arbitrary) set of reading tasks against which they can be measured, and perhaps helped, but if not, then pushed aside. Research conducted within a socio-cultural framework would tend to support this kind of approach — a focus on at-risk environments, rather than at-risk students.

Alvermann also discussed research on accelerating students' reading achievement. She related that members of the National Reading Panel (NRP) had identified seven strategies that have been found to improve students' reading comprehension of specific academic areas, such as social studies. They include:

- ★ Comprehension monitoring, which teaches readers how to be aware of their understanding of the material;
- ★ Cooperative learning, where students learn reading strategies together;
- ★ Use of graphic and semantic organizers (including story maps), making graphic representations of the material to assist comprehension;
- ★ Question answering, in response to questions posed by the teacher who gives immediate feedback;
- ★ Question generation, where readers ask themselves questions about various aspects of the narrative;
- ★ Story structure, which teaches students to use the structure of the story as a means of helping them recall story content; and
- ★ Summarization, which teaches readers to integrate ideas and generalize from the text information

Alvermann noted that further research on the application of these various approaches within the framework of developmentally responsive middle grades education will be valuable.

She discussed research on the use of computers to foster subject matter learning, by summarizing the NRP's general statements about the potential for using computer technology in reading instruction:

- ★ The addition of speech to on-screen text promises to enhance the versatility of technology in reading instruction;
- ★ The use of hypertext — text that links to supporting information and audiovisuals — may enhance traditional methods of reading instruction; and

- ★ The use of word processing technologies may be advantageous, as reading instruction is known to be most effective when integrated with writing instruction.

Alvermann noted implications for literacy practice, policy, and future research. Regarding literacy practice, she cautioned that the report of the NRP must be read with a clear understanding of its limitations in two areas: the panel did not address issues relevant to second language learners and did not consider research that fell outside the experimental and quasi-experimental designs of quantitative research. Thus a large body of potentially rich findings was overlooked.

She discussed the danger of allowing literacy advances to be gauged only by traditional standardized tests. Comparing scores on standardized tests of one group to another will always result in inequities because all students don't follow the "normal curve." Schools must also develop a realistic attitude about alternative curricula, which often leave students ill prepared for the demands of the larger culture.

Alvermann recommended that future qualitative research zero in on reading comprehension and that findings be analyzed in a way that makes them available (and interpretable) through cross-case comparisons. Also, she recommended that new experimental or quasi-experimental research be designed to address hypotheses that arise from more in-depth and close-up qualitative work. Research is also needed on computer technology and the media and its relation to young adolescents' out-of-school interests in computers and in-school subject matter. Further, researchers must study the degree to which the knowledge base in middle grades literacy education is being translated into practice and to what effect.

The members of the National Reading Panel had located only four studies that met their research design criteria on the topic of teachers' implementation of comprehension strategy instruction. Although limited in what they could say based on this small number of studies, the panel released two general statements:

- ★ Teachers require instruction in explaining what they are teaching, modeling their thinking processes, encouraging student inquiry, and keeping students engaged.
- ★ In order for teachers to use strategies effectively, extensive formal instruction in reading comprehension is necessary, preferably beginning as early as preservice. (Report of the National Reading Panel, 2000, p. 16)

Alvermann closed by posing a number of thought-provoking questions. What is real reading? What counts as reading when reading really counts? What is the danger in continuing to view literacy as a set of "neutral" psychological skills that are easily, if narrowly, measured rather than as a complex mixture of social and political practices through which to work toward equality and social justice for all?

Respondents

Speaking from the practitioner's perspective, Leah Meyer Austin identified four issues that were slightly different from Alvermann's: resources, professional development, time, and high stakes testing.

- ★ *Resources:* First, school and public libraries have a dearth of compelling, timely reading materials that appeal to the diversity of students' cultural backgrounds, interests, and reading levels. Perhaps, in many districts, technology purchases have usurped purchases of reading materials. Second, middle grades class sizes are generally too large, which diminishes reading instruction.
- ★ *Professional Development:* Teachers are still not prepared to teach reading in their language arts classes, let alone in the subject areas across the curriculum.
- ★ *Time:* First, students spend far less time practicing and using their reading skills. Second, teachers have little time to plan with one another; therefore, "reading across the curriculum" becomes another empty phrase.

★ *High-Stakes Testing:* Unfortunately, the high standards we all want for all students are not yet matched by high support. In some cases, students — especially those from low-performing schools — spend more time on skill and drill and less on reading.

Austin concluded by drawing implications for research. The NRP should reconsider its stance on qualitative research, she recommended. She called for "practice-driven research." In addition, more impact studies are needed to assess middle grades literacy, professional development, resources, time, high-stakes testing, and community involvement. Austin called for an agenda for research, practice, and policy that goes beyond the battles of either-or. For example, we must consider both whole language and skills; qualitative and quantitative research, technology and print materials; not be forced to choose between them.

Lea Schelke responded to Alvermann's four main points. She described a typical classroom that includes a variety of "struggling readers," general education students, special education students, bilingual and gifted students. Many teachers work hard to prepare for them all. Accelerating students' reading achievement in the future will require teachers to have a huge portfolio of reading strategies because what works with one student today will not work tomorrow. In using computers and other media to address literacy, she urged caution to ensure that technology does not interfere with reading or take time away from discussion. If we were to translate research into practice, she called for qualitative research that considers the whole society, the community, the parents, and what is going on in students' lives. She also urged the research community to pursue studies about how practitioners utilize education research in their classrooms. Schelke ended her remarks by talking about the important roles played by the media center librarian, the principal, and the curriculum director.

Related Concurrent Sessions

In his concurrent session, Robert Jiménez focused on literacy learning needs of Latino students and emphasized the importance of considering cultural differences. Current efforts overlook the linguistic and cultural riches, knowledge, and information that students from linguistic-minority backgrounds bring to the classroom. He described his qualitative research project with the formative experiment approach (combining equal methods of investigation with intervention to improve instruction) that involved competent, average, and low-performing groups of bilingual readers in grades 6-7. He shared with the low-performing readers the kind of strategies used by the high-performing readers. Using cultural props to elicit language and culturally relevant text, he taught students the think-aloud procedure and assisted them with word recognition skills. His preliminary findings indicate that after the intervention students were more focused on school-centric literacy tasks. They recognized similarities in the processes used in reading Spanish and English. But he also found that students might see learning to read in English as being asked to give up a part of their linguistic identity. While students wanted to be literate, schools were not necessarily providing effective opportunities.

Margaret McKeown's concurrent session focused on two of the seven strategies identified by Alvermann: question answering and question generation. The point of asking questions, she said, "is to help students understand what they don't know and to reveal what they do know. McKeown focused on several productive strategies:

★ Questioning the author allows students to grapple with and respond to the ideas they read about. Typical questions are "What is the author trying to say?" and "How does that connect with what we read about before?"

★ Open questions are implemented in the classroom through predictions and eliciting prior knowledge. Typical questions are "What's this about?" and "What's going on?"

★ Follow-up questions are directed toward building meaning. Sample questions are: "Do you want to add to what [x] said?" "What does [x's] statement mean?" "What do you think will happen next?"

McKeown strongly recommended that students should be asking questions that foster thinking. She reported that she and her colleagues found changes in the roles in the classroom when questioning was implemented.

For example, teachers' questions changed from asking students to retrieve information to focusing on considering and extending meaning. Students' responses began to focus on constructing meaning and integrating ideas. Student-to-student interactions became more common.

During her concurrent session, Mary E. Curtis recounted her experiences at Boys Town in Nebraska. She translated research into practice by implementing Diagnostic Assessments of Reading (DAR) to assess word recognition, oral reading, silent reading, spelling, word meaning, and word analysis. Relying on Chall's six stages of reading development, Curtis created the following courses that met the diagnosed needs:

- ★ *Foundations of Reading* — provided an analytical approach to teaching phonics and spelling while making the students apply the phonics through collaborative reading of novels;
- ★ *Adventures in Reading* — promoted word recognition and understanding of meaning through software, games, and collatorative oral reading;
- ★ *Mastery of Meaning* — focused on learning vocabulary through direct instruction and include developing concepts; and
- ★ *Explorations* — involved study skills and developing efficient problem-solving skills incorporating reading and writing in the content areas.

Curtis found that two-thirds of the Boys Town students had accelerated growth (more than one year of growth for a year of school). Longitudinal studies showed that students were most successful in developing basic reading comprehension and vocabulary.

Catherine Cobb Morocco and Nancy Clark Chiarelli, in collaboration with staff from Compton Drew Middle School, provided an example of a whole school literacy program that sought to translate research into practice. The program built on research that showed the importance of active, intentional learning; distributed expertise; reflective, metacognitive learning; deep content knowledge; discourse; and systems and cycles. Students, heterogeneously grouped, work in groups of five or six. The work is inquiry-based with a shared outcome. The learning process moves through three phases:

- ★ Dilemma phase: anchor, generate and categorize questions;
- ★ Research phase: reciprocal teaching, cross-talk (circle format, large and small groups, more or less structured), knowledge forum, benchmark, calling in experts; and
- ★ Sharing knowledge: cross-talk, jigsaw.

Compton-Drew uses a school-wide approach, where the staff has ownership of professional development. Videotapes are part of professional development. Many teachers have published to disseminate their ideas.

Nancie Atwell's concurrent session addressed one of the main elements of overall literacy programs: writing. She described the Writing Workshop approach where students write about meaningful topics, and their teachers act as writing coaches. Teachers also provide informative lessons about practical matters, such as language conventions. The goal is purposeful expository writing, where students learn that writing is thinking and that multiple attempts at thinking are expected. In terms of defining features, the writing workshop:

- ★ Creates a physical sense of community;
- ★ Enables students to talk as writers and readers;
- ★ Requires students to present status reports;
- ★ Provides time for students to write, first by hand, then on a word processor using resources such as a thesaurus and character worksheets;

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- ★ Requires students to prepare a cover sheet for each piece of writing, create personal writing folders, develop a personal proofreading list, and use books for research;
- ★ Provides places for student peer writing conferences with question lists; and
- ★ Includes student-teacher conferences where teachers ask leading question, make suggestions, give advice and collaborate with students.

The State of Mathematics

Mathematics in the Middle Grades: Linking Research and Practice
Judith T. Sowder, San Diego State University

Respondents
Glenda Lappan, Michigan State University
Terri Mozingo, Charlotte-Mecklenburg Schools

Related Concurrent Sessions
Achieving Systemic Change in the Teaching and Learning of Middle School Mathematics
Diane J. Briars, Pittsburgh Public Schools

Recent Progress in the Teaching of Critical Topics in Middle Grades Mathematics
James T. Fey, University of Maryland

NCTM's Principles and Standards for School Mathematics: Overview and Implications
Joan Ferrini-Mundy, Michigan State University

Mathematics: Caught in the Middle
Thomas A. Romberg, University of Wisconsin Madison

Plenary Session

Much is known about the learning process in mathematics in the middle grades, said Judith Sowder. While values deeply affect our decision-making about what mathematics education should look like in today's schools, their role is not fully appreciated. Values function as the "criteria people use to select and justify actions and to evaluate people and events" (Schwartz, 1992, p. 1). All decisions and standards concerning mathematics are founded on values, even when they are not made explicit. For example, the new NCTM Principles and Standards of School Mathematics, recently published in 2000, represents a particular set of values which differ from materials published by, for example, the group known as "Mathematically Correct."

Sowder reviewed some important issues relating to curriculum and instruction in mathematics, highlighting the role of values. She focused on three key topics:

- ★ *Number and number relations.* In the middle grades, students make important conceptual shifts. They move from manipulating whole numbers to working with signed numbers and rational numbers and from a focus on addition and subtraction to multiplication and division. When teachers do not understand the significance of these subtle changes in how numbers are used, students can become very confused.
- ★ *Extended reasoning power.* Almost all situations dealing with growth comparisons require multiplicative reasoning. The ability to reason multiplicatively is basic to proportional reasoning. The development of this skill is one of the major mathematical hurdles of the middle grades.
- ★ *Algebra.* Algebra, when approached as a natural extension of arithmetic, can be thought of as generalized arithmetic. It provides a symbolic language used to represent and analyze quantitative relationships. While school districts require that all students take algebra in eighth grade, many questions remain about whether this is the developmentally appropriate time.

Sowder discussed instruction in the classroom environment, focusing on three areas:

- ★ *Teaching problem solving:* It is not enough to be able to carry out paper-and-pencil long division. A student needs to know when to divide or what the results mean. Solving story problems means sorting out some ambiguity, which can elicit frustration and anxiety before a solution is reached. However, solving these challenging problems can be the source of considerable pride and a feeling of mathematical power.
- ★ *Motivating students to learn:* Research tells us five key facts about motivation:

  (1) Motivations are learned.
  (2) Motivation hinges on students' interpretations of their successes and failures.
  (3) Intrinsic motivation is better than engagement for a reward.
  (4) Inequities are influenced by how different groups are taught to view mathematics.
  (5) Teachers matter.
- ★ *Tracking students by ability:* Tracking (grouping students by ability) has not been shown to improve outcomes for all levels.

Sowder concluded by listing the implications for linking research to practice, drawing on the work of Kennedy (1997). First she said that our research is considered by many to be neither authoritative nor convincing. Many of the questions being asked today relate to values and cannot be answered with research. Research results that do exist but that do not coincide with one's value system are often considered unauthoritative and unconvincing. We need to do more to help parents, teachers, and policy makers understand the role of values in making decisions, and we need to provide opportunities for reflection and discussion of what is valued. Research can be persuasive and authoritative only when people are fully aware of what they value, and when they are willing to consider evidence that refutes those values.

Second, Sowder said that many teachers and policy makers believe that most research has little relevance to the decisions they must make. Many research studies in mathematics education offer sound principles for the practice of teaching mathematics. But not only research findings have relevance to the classroom. Many times the theoretical constructs that underlie the research or the tasks used in a research study can prove useful in practice.

Research can affect practice only if the research is accessible to teachers and policy makers. Unfortunately, research published in research journals is not written to be easily accessible to teachers. Much research is considered to be irrelevant simply because of this problem of accessibility. Some bridge is needed between research reports teachers and policy makers.

Respondents

In her response, Glenda Lappan noted that developing both motivation and a disposition toward tackling mathematics is one of our biggest challenges during the middle grades. If young adolescents do not connect to mathematics, they have made a key decision about themselves as learners that will influence their future educational and employment choices.

Lappan's approach is to look at teaching mathematics through the lens of problem solving. Problems should be front and center in the curriculum. What we have been doing for the past 50 years doesn't work: we have broken down mathematics into small pieces, teaching ideas one at a time, and expecting students to figure out the big picture of what mathematics is about from those small pieces. The result is that students do not have the big picture. Over the past 10 years, the shift has been to create a new kind of environment for teaching mathematics. Today students have an opportunity to interact with each other, give and receive help from peers, and interact while solving challenging problems. In comparison studies with traditional approaches, students using this approach make more gains.

Picking up on Sowder's perception that algebra should be thought of as generalized mathematics, Lappan sees algebra as a deep study in variation and change. Lappan argued that we must offer students a number of ways to show their mathematical talent. New kinds of learning opportunities that allow students to demonstrate their abilities in broad, meaningful ways can positively affect teacher and student understanding of what constitutes mathematical ability.

Terri Mozingo, drawing on comments from mathematics specialists, said she was intrigued by Sowder's remarks about the role of values in educational curricula. The values "war," she said is between the traditional perspective which advocates a pure mathematical approach (rote arithmetic, no calculators, paper and pencil approach to computation) vs. the standards-based approach where students learn computation in a meaningful context, understanding why calculations work. Students need more than a traditional understanding of mathematics, especially in light of a changing society and the role of technology.

Mozingo pointed out some implications affecting practice, research, and policy. First, the majority of today's teachers have learned mathematics using a traditional approach. Second, most curricula emphasize skills, not methods of instruction. While teachers say they teach the curriculum, they may not be conveying how and when to use the skills. Third, to teach problem solving, educators and policymakers must help parents and others see the value in teaching problem solving and thinking mathematically. Fourth, policy should acknowledge that mathematics curriculum is value-laden. We need input from a diverse group of stakeholders. In addition, we must close the gap between the concepts that drive research and implementation in the classroom.

Related Concurrent Sessions

Joan Ferrini-Mundy drew on her experience as the chair of the writing council for the National Council of Teachers of Mathematics. The new NCTM standards acknowledge that as the world changes, math instruction is not giving students what they need. The standards also note that while children can compute, they cannot solve problems as well as they should. The NCTM Principles and Standards of 2000 differ from those of 1989. They present less focus on "real world" problems and include a more timely, extensive discussion of technology. The standards for grades 6 through 8 take a stand in three areas: rational numbers, linear functions, and proportionality, with the goal of developing flexible problem-solvers. She emphasized the importance of the new standards' becoming part of textbooks. Textbook companies are driven by the market, so a grassroots interest will steer them to try out elements of the new standards. NCTM held a publishers conference and is also producing some materials on its own in order to drive this process.

Thomas Romberg addressed the challenges of standards-based reform.

- ★ Educators must create a coherent vision of what it means to be mathematically literate in a rapidly changing world.
- ★ Math literacy applies to four domains: number, algebra, geometry, statistics/probability.
- ★ "Literacy" means the human use of language and relies on the design resources of the language for different social functions. Therefore, math literacy implies that students learn the design of math to solve the social functions of non-routine problems in a variety of situations.

Based on the work of other researchers in the field, Romberg characterized understanding in five integrated forms of mental activity:

- ★ construction of relationships;
- ★ application of math and science knowledge;
- ★ reflection about math and science experiences;
- ★ articulation of what one knows; and

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- ★ incorporation of math and science knowledge into one's life.

Romberg explained that virtually all complex ideas in math are understood at different levels in different ways. The level of understanding will change with the level of classroom experiences. There is a development process from informal to formal in each domain, as well as a balance between learning concepts and procedures and using them to solve non-routine problems.

Student achievement comes from instructional quality, a strong curriculum, instructional techniques, and assessment. In a case history detailing the experience of one school transferring to a new curriculum, Romberg demonstrated how initial results can be deceiving. In this case, an Iowa school followed a cohort through curriculum implementation. While the children had good scores initially, they dropped across the board during the first year of the new curriculum, especially in the area of computation. Despite criticism, the school stuck with the program. The next year, the scores rose in all three measured areas: concepts, problem solving, and computation. This upward trend continued during the final two years of the study, by which time the students were scoring at double or more than double the national average on standardized tests. More than anything, the study showed the need for time in implementing a new curriculum.

Romberg noted that school capacity develops through the interplay of the teacher's knowledge, skills, and disposition; technical resources; program coherence; teacher access to a professional community; and leadership by the principal. Curriculum is only one feature; no curriculum is "teacher-proof" or "school-proof." The need for teachers to meet and plan together cannot be overstated, Romberg pointed out, but it is often understated.

Diane Briars focused on the practitioner perspective and community connections. She described the Pittsburgh Reform in Mathematics Education (PRIME) project, which involves a systemic approach to change based on national (NCTM) standards. Key elements include:

- ★ Support from the community/educational system;
- ★ The math classroom as part of the larger community;
- ★ Parent involvement; and
- ★ Clear roles for all stakeholders.

She also described the instructional design principles of a research-based mathematics curriculum—Connected Mathematics — to show what curriculum and instruction should do:

- ★ Identify big math ideas around which to focus instruction;
- ★ Build on big ideas — making connections;
- ★ Teach to support student development of deep understanding of and skill in using concepts and strategies; and
- ★ Assess student understandings in multiple ways

Connected Mathematics encompasses number, algebra, geometry, probability/statistics, etc. There are eight units (big ideas) at each grade level.

In his concurrent session, James Fey stated that computational skills are not as important as they used to be simply because people aren't doing mathematics the way they used to. The critical issues for mathematics are procedural and conceptual routines to help students understand the subject and why they are doing mathematics. Materials should be written in such a way that both teachers and students could learn from them. The goal

in a classroom is an environment to help students think and to analyze their work.

Fey illustrated ways in which interpreted research could be taken back to the classrooms. He provided a number of examples of teacher resources and children's work related to the following instructional themes:

- ★ Deep conceptual understanding;
- ★ Ideas encountered first in problem-solving;
- ★ Concepts before systematic procedures; and
- ★ Connections among content strands.

He also described an instructional model that includes the following process:

Launch: Pique interest in a mathematical situation.
Explore: Search for patterns that yield numerical and visual data.
Summarize: Articulate patterns and generalizations.

Fey also identified some of the ideas that influence constructivist pedagogy.

- ★ Instruction should engage students in experiences that challenge their prior conceptions and beliefs about mathematics.
- ★ Instruction should encourage student autonomy and initiative. The instructor should be willing to let go of classroom control.
- ★ Instruction should encourage the spirit of questioning by posing thoughtful, open-ended questions and encouraging discussion among students.
- ★ Instruction should use interactive physical materials, authentic data, and primary sources.
- ★ Instruction should not separate knowing from the process of finding out.
- ★ Instruction should insist on clear expression from students, based on the assumption that when they can communicate their understanding, they have truly learned.
- ★ The instructor should become one of many resources that students may learn from, not the primary source of information.
- ★ The instructor should allow student responses to drive lessons and seek elaboration of students' initial responses. Allow students some thinking time after posing questions.

There is no simple answer, Fey said, to the question of how to educate the public and policy makers about what needs to be done to educate students. Accountability, however, will not simply go away. A lot of tests, he suggested, have little to do with mathematics.

The State of Professional Development

Teachers' Professional Development For Vital Middle Schools: What Do We Know And Where Should We Go?
Karen Seashore Louis, College of Education and Human Development, University of Minnesota

Respondents
Patrick Montesano, Academy for Educational Development
Ken McEwin, Appalachian State University

Related Concurrent Sessions

Standards-Based Results-Driven Professional Development
Stephanie Hirsh, National Staff Development Council (NSDC)

Lessons Learned: Leadership Development that Fosters Shared Leadership and Results
Susan Galletti, GALEF Institute

Baby Steps and Slight Nudges Can Move Mountains: How to Accomplish School-wide Change
Michelle Pedigo, Barren County (KY) Middle School

Plenary Session

Karen Seashore-Louis argued that we do know a lot about how to provide good professional development to support changes in schools for young adolescents. However, she claimed that we have not yet put these pieces together in ways that sustain the broad changes that are demanded. It is premature to come up with "a solution" that blends what we know about effective middle schools, effective staff development, and effective "large scale change," because we still must rethink how the puzzle should be approached.

Currently, two paradigms prevail. First is professional development as a component of school reform. This approach claims that

(1) schools need to change because they are currently inadequate;

(2) change must be stimulated by widely agreed-upon standards, developed by the profession or by the profession in conjunction with scholarly collaborators;

(3) new standards demand development to bring teachers' beliefs and skills in line with emerging pedagogic demands; and

(4) development must be professionalized; that is, it must build capacity for change within and among teachers rather than through older models that emphasize the transmission of knowledge from experts to passive teacher-consumers. A large number of approaches to professional development emerged in conjunction with the systemic reform paradigm. For example, Corcoran (1995) identified a number of promising approaches, based on preliminary research evidence, such as teacher networks, school–university collaborations, professional development schools, and national board certification of teachers. These strategies, which continue to be explored in the research literature, not only have a shared goal of teacher learning, they also have in common a focus on providing stimulation from outside the school for teacher learning.

The second paradigm is professional development as a component of teacher improvement. This approach emphasizes both increased individual skills and knowledge and the development of supportive school cultures and school leadership. A number of specific proposals for professional development strategies that can change teachers' cognitive models about content and pedagogy in middle school settings have found solid support: enhancing skills and understanding through participation in materials and instructional design, encouraging and providing opportunities for reflection, teacher as researcher, and interdisciplinary teaming.

Louis pointed out the limits of the existing approaches: lack of robust data on adolescents' need for unique environments, relatively weak conclusions on professional development, lack of knowledge about what staff development should consist of in the middle grades, teachers expectations for professional development to provide pragmatic, immediately useable information, and the need for reallocation of resources.

Louis provided a vision of how we can approach the problem with a new map that goes beyond managed change and teacher professionalism in staff development. The reform model and the improvement model have an uneasy co-existence in the lives of most practitioners, who are subjected to state and local policies that incorporate both images without reconciling their differences (Louis, 1998). Yet, it is unlikely that the policy environment will change sufficiently or that a simpler or more coherent reality will emerge.
Louis discussed the elements of change in professional practice in middle schools.

Middle school development is a result of a variety of influences, each of which will affect the kind of professional development that is most appropriate. These include:

- ★ An autonomous developmental process (organizational life cycles) including the acknowledged, but unplanned for, enormous increase in new teachers in most systems, due to retirements;
- ★ Deliberately directed attempts (from within and from outside) to bring about educational and organizational changes; and
- ★ Unanticipated events or "normal crises," both positive and negative, such as leadership turnover, changes in state policy that must be factored into the development process.

This set of factors, in which non-planned change dominates all planned change processes, leads to the following conclusion: Effective middle-school development is an ongoing process in which the simultaneous effects of autonomous, coincidental, and deliberately directed changes that affect the functioning of schools converge. Every professional development program must be attuned to the developmental issues facing the school.

The implication is, of course, that most schools will need to blend models in a continuously evolving effort to provide support for a "vision" that is also evolving based on school's current conditions. This matching process is not a "science" but the art of adjusting action to the combined influence of autonomous, planned, and unplanned changes within the school and its context.
Louis asserts that the tools we need are mental models, not techniques. The beliefs/mental models that are particularly relevant to middle grades education are: learning as constructed; learning as self-regulated; learning as contextual; and learning as social. While most teachers who have been exposed to middle-school models in professional development settings are aware of what is expected of them and can articulate these concepts, they are still torn between their belief in structure and order, and the newer constructivist models. In other words, skills in concrete classroom practices (such as cooperative learning) do not necessarily translate into a persistent effort by teachers to organize their work in new ways. The issue, then, for professional development is to move beyond knowledge and skills that are appropriate for implementing Turning Points to the larger issue of creating fundamental dispositions to teach and work in new ways.

In order to do this, Louis suggested several strategies. First, schools must promote the development of professional communities within schools by creating organizational conditions that promote joint problem solving

among teachers on how to create new models of schooling. Professional development by itself does not lead directly to improved teaching unless the overall organizational conditions promote risk-taking and collective responsibility for student success.

The second strategy is to create teacher-principal teams and provide parallel professional development for administrators. The needs of school leaders and their central role in encouraging and creating standards for school development must be part of a professional development model.

In conclusion, Louis said, "Middle schools must address not only the need for new skills and knowledge, but also their embedded, dysfunctional learning habits." The implications include:

- ★ The middle school vision will continue to evolve in highly politicized settings in which external and internal demands will shift and will sometimes be incompatible.
- ★ Teacher change and school reform strategies for professional development tend to proceed from different assumptions, but both should be incorporated into our thinking about professional development for middle schools.
- ★ Our knowledge about staff development strategies to promote effective middle schools is just beginning to emerge — we know enough to set out on the journey, but not enough to develop simple plans for how to do it right.
- ★ Changing teachers' beliefs, knowledge and skills is central and difficult — but it is not enough. Attending to professional development without considering the context of organizational and leadership cultures is likely to result in superficial change, as is the reverse.

Respondents

Patrick Montesano responded to Louis's connection between professional development and whole school reform and elaborated with a discussion of the contextualized nature of professional development. He identified some challenges and raised some questions. One challenge is that job–embedded professional development often does not address the larger context. For example, middle school professional development does not always encompass the new standards in English language arts, the latest research on early adolescence, knowledge about local cultures and customs, and data on structure learning and achievement. If professional development does not take these into account, it will fall short. He offered recommendations for the audience to consider.

- ★ Professional development should begin with a careful assessment of what students need to know and be able to do.
- ★ Teachers should figure out what they need to know and be able to do in instruction, student assignments, and school organization in order for every student to succeed.
- ★ We should support professional development in the short and long term, as part of the way the school does its business.

Reform efforts that collaborate with professional development programs should create a comprehensive school reform model. The Middle Start Initiative, for example, links the expertise of national groups with local knowledge and skill to build public awareness of and engagement in regional and local middle grades reform efforts. Preliminary research suggests that this collaborative approach has already contributed to progress and is promising approach for other schools.

Ken McEwin emphasized the critical need to improve middle level teacher preparation and staff development. He claimed that we have been engaged in "malpractice" for 100 years, allowing anyone with a degree to teach young adolescents. The problem is not with the teachers, he added, but the preparation we give them.

He reported on certification research carried out by Peggy Gaskill. She found that 45 states now have some kind of endorsement for middle level teacher preparation standards. He called for people to pay attention to the five sets of standards produced by the National Board for Professional Teaching Standards aimed at teachers of young adolescents. These should be considered in planning teacher preparation and staff development programs. He recommended that it would be beneficial for school districts (teachers and administrators) to collaborate with university faculty to create professional development schools and/or other initiatives. In discussing the effect of regulations at the state level, he warned that we must be very careful that states not have overlapping licensure. We need a separate program and license for teaching young adolescents.

His recommendations also included the following:

(1) Professional development needs improvement, both for those preparing to teach and those currently on staff.

(2) Presenters must discuss the needs of young adolescents and not assume that participants have this background knowledge.

(3) Teacher educators need to develop team–oriented staff development.

Related Concurrent Sessions

Stephanie Hirsh outlined the core components of powerful staff development:

- ★ Builds a culture that supports innovation, experimentation, and collegial sharing;
- ★ Engages teachers in daily planning, critiquing, and problem solving;
- ★ Deepens teachers' content knowledge (e.g., content colleges in South Carolina);
- ★ Expands teachers' instructional skills in content areas (pedagogy connected to content);
- ★ Teaches classroom assessment skills that allow teachers to regularly monitor gains in student learning (assessment literacy);
- ★ Provides ongoing classroom-based ("at-elbow) assistance; and
- ★ Connects teachers and schools to reform networks.

For Hirsh, a model professional development program, where substantial learning occurs daily, would involve 8–10 teachers convening for at least an hour daily to discuss the following questions:

- ★ What are the standards for our students?
- ★ How are students doing?
- ★ What do we need to do next?
- ★ What do we need to learn together?

Reflecting on Louis's call for school leaders to play a key role in professional development, Hirsh emphasized the following leadership responsibilities:

- ★ Promote standards for student learning, teaching, leadership, and staff development;
- ★ Be data-driven;
- ★ Advocate for adequate resources (at least 10 percent of budget, 25 percent of time);
- ★ Seek compensation for knowledge and skills, not seat time (change in practice, results for students);

- ★ Strengthen school improvement plans;
- ★ Evaluate the impact and quality of staff development (for teachers and students), and
- ★ Ask tough questions.

Sue Galletti also discussed the importance of leadership. She asserted that if we want school leaders to be engaged in a professional learning environment, we need to engage the principals in the same kind of professional development that we expect the principals to engage the teachers in. She outlined several skills, attitudes, and dispositions that can be nurtured in principals to produce results. These include:

- ★ Development of shared leadership;
- ★ Ability to build structures that allow the good things to work together — common planning time, and teachers talking about learning rather than discipline;
- ★ Curriculum leadership — understanding what is being taught in school and why;
- ★ Assertive instructional leadership — knowing how to get job done quickly, believing that people are capable;
- ★ Organization and delegation skills;
- ★ High expectations;
- ★ Clear goal and task orientation — being clear about what needs to be done and how to make it happen;
- ★ Ability to communicate policies clearly;
- ★ Visit classrooms frequently;
- ★ High visibility and availability; and
- ★ Aptitude for parent and community relations.

Michelle Pedigo's concurrent session, based on her experience as a principal, supported these key ideas. She related how she worked to translate these ideas into practice by setting standards for her school to meet the national and county standards. She adopted a leadership strategy that was well–developed, based on multiple intelligences, and arts–infused.

As a principal, she established a multi–faceted professional development program and devised a results–based plan. Instead of faculty meetings, she held content and team meetings for teachers. The meetings focused on data or a document, based on success with high, medium, and low achieving students. Ms. Pedigo used team meetings facilitated by team leaders for planning, and reduced the meeting times from twice to once a week to give teachers more time for other responsibilities and professional development.

Other changes at her school included the use of a school–wide instructional specialist, leadership development strategies, and attendance at national conferences for teachers. The implications for research, she says, are a whole school change model. She believes that implementing curriculum mapping and looping are the next steps for schools in transition.

How do these guidelines manifest themselves within the content areas? In her paper on mathematics, Diane Briars from the Pittsburgh Public Schools listed key features of professional development around mathematics.

- ★ Content is aligned with the curriculum that teachers have to teach.
- ★ It addresses subject matter knowledge and pedagogy.

- ★ Those who design, lead, and do follow-up have appropriate expertise in subject matter, pedagogy, and children's learning.
- ★ It offers teachers a "safe zone" to ask questions, risk failing, and try out new approaches and practices.
- ★ It incorporates follow-up, including on-site support (e.g., coaching or study groups).
- ★ It provides organizational support for desired practice.
- ★ It is extended over time so teachers have opportunities to deepen their understanding, reflect on practice, extend applications, etc.
- ★ It is directly related to practice and makes an explicit connection to standards, instructional materials, and assessments.
- ★ The focus progresses, e.g., curriculum "walk throughs" (50–60 hours in year one); content strands, pedagogy, assessment (25–30 hours per year); reflection on practice (seminars, 24 hours each).
- ★ It encompasses workshops (after school, Saturday, summer) that are both central and site-based.
- ★ Demonstration teachers provide in–class support: demonstration lessons, coaching, co–planning, and parent/community workshops.

THEMES AND RECOMMENDATIONS

A panel of distinguished researchers, policymakers, and practitioners (see Figure 1) issued recommendations on literacy, mathematics, and professional development to the National Educational Research Policy and Priorities Board.

Two questions guided the panel's work:

- ★ What research questions must be answered to accelerate literacy, mathematics, and professional development in the middle grades?
- ★ What policies can support young adolescents' literacy and mathematics learning and teachers' professional development?

Each panel member was assigned to one of the conference strands: literacy, mathematics, or professional development. Each panel drafted a set of recommendations that were presented to conference attendees in a concluding session. During that session, conference attendees offered comments, additional recommendations, and suggestions. Panel members drafted final recommendations after the conference. Rather than recommend specific actions, the panel chose to identify needs that must be addressed from both the research and policy perspective. This approach reflects the complexity of needs and the mandate for researchers, policymakers, and practitioners to work together on behalf of middle grades students' learning. Recommendations for each of three areas are presented below.[2]

Literacy

The literacy strand featured presentations from practitioners and researchers involved in developing theories and approaches for enhancing teaching and learning in English language arts: reading, writing, listening, and speaking. While each session highlighted a different set of issues and strategies, they were linked by several overarching themes, all of which directly affect policy, research, and practice. The themes are:

Curricular and Organizational Structures. How do the organizational structures found in today's middle grades schools help or hinder students' literacy development? Pressed to make the most of the time available during a school day, schools make decisions that have a significant — but often unintended — impact on students' literacy development. For example, reading may be dropped as a separate class, or standardized test preparation may take time away from reading. Built-in planning time is often lacking, preventing teachers from collaborating on reading efforts. Without that, high–profile initiatives such as "reading across the curriculum" become empty phrases, raising hopes that may never be fulfilled.

Teacher Preparation, Qualifications, and Professional Development. The most promising literacy approaches depend upon skilled professionals who are avid learners and readers. Many middle grades teachers want but lack training in how to help teach students of varied abilities and needs. Teachers often are not prepared to teach reading in their language arts classes, let alone in other subject areas.

Scarce Resources. The middle grades receive fewer resources than any other school level in both state and federal funding. Such funding often goes primarily to math and science programs, leaving little for literacy initiatives. School libraries often lack compelling, timely reading materials that appeal to diverse cultural backgrounds, interests, and reading levels, and the school librarian position is disappearing in all too many middle grades schools. Funds that once would have been used to purchase books are often spent on hardware and software. While

resources cannot cure every ill, a solid base of materials is needed to sustain efforts to enhance students' literacy.

Knowledge about Effective Practices. Much of the current research seeks to answer questions about theoretical constructs and the effects these have on learning. We do not know enough about why some practices or models are effective and how implementation affects outcomes.

These five themes served as a structure for the closing session about the literacy strand and guided the recommendations outlined below.

Research Needs

- ★ Encourage practitioners to contribute to the research agenda. "Research-driven practice" receives a lot of attention but we also need "practice-driven research." Teachers, principals, and parents want to know more about what is working in classrooms and why.
- ★ Conduct more impact studies to determine the effects of professional development and the impact of resources, time, and high-stakes testing on middle grades literacy.
- ★ Assess the degree to which the research in middle grades literacy education is being translated into practice. We need quantitative and qualitative studies that investigate the characteristics of schools that effectively apply relevant findings to their curriculum and instruction, especially to teaching reading across the content areas.
- ★ Develop a clear understanding of how different curricular and organizational structures can promote literacy development. We need to examine how schools can be organized so that they devote more time to reading. We also need to understand whether reading is best taught as a separate class or in conjunction with literature and other subjects. Another research question is how to give teachers more time to discuss instructional issues and examine student work during the school day.
- ★ Examine student assignment patterns (heterogeneous versus homogeneous grouping.) in relation to literacy development. If flexible grouping and regrouping of students works, under what circumstances and for whom? There is currently no research that addresses this question satisfactorily.
- ★ Increase our understanding of how culture and issues of identity affect the literacy development of students, including those who are Limited English Proficient (LEP) or those who are placed in English as a Second Language (ESL) programs. What programs effectively develop the literacy skills of these students? What makes these programs effective? Can multicultural literature help promote literacy development?
- ★ Pay greater attention to the role of the community in middle grades literacy. Parents, public libraries, youth-serving organizations, churches, and others all can play a role in encouraging young adolescents as readers and thinkers. In what ways can schools partner with families and the community to create literacy–rich environment for children? How can we all encourage young people to read more?
- ★ Enhance university preparation of teachers to teach middle grades students with diverse needs, e.g., study effective teacher preparation programs and follow teacher performance over time.
- ★ Examine the dynamics of the widening achievement gap between poor and higher income students. We need to understand where the specific gaps exist and why. Research on improving achievement and identifying the sources of the achievement differential has rarely included the role of culture. Further, we need to examine the effectiveness of standards in raising achievement for students from low–income families.

- ★ Examine literacy development in the context of comprehensive school reform. What are the characteristics of the school organization and culture that foster improvement in literacy, teaching and learning? How can school restructuring enhance students' literacy development? Are specific models more effective than others?
- ★ Focus research on "struggling readers" by identifying which programs/strategies work best with which students under what circumstances.

Policy Needs

- ★ Refocus Title I funds so that the middle grades have the resources needed to help students who have not learned to read. We need to identify other types of resources that can support the development of literacy in the middle grades. For example, some schools hire literacy coaches who work with teachers to improve curriculum, instruction, and assessment. About 20 states are using this approach.
- ★ Formulate consistent policies that do not pit purchasing books against purchasing technology equipment. We must restock libraries and classrooms with both reading materials and computers.
- ★ Develop a clear policy on teacher qualifications, certification, and the role of professional development in literacy. Should pre-service teachers at the middle level be required to receive formal reading instruction? Should certified teachers be required to receive training in strategic reading skills? Policies should also support the recruitment and retention of effective school-based professionals.
- ★ Focus on building links between technology and the media programs at school and young adolescents' interests in computers outside of school.
- ★ Engage in more comprehensive planning to change the system and structure of education, so that it addresses all the complexities of human development. We need to ensure that we truly work toward "educating all children," not just those in the regular education classroom. We need to train teachers to understand why all children are not succeeding in the regular classroom and to use the instructional strategies that will enable them to be more successful with all students.

Mathematics

The mathematics strand featured presentations from practitioners and researchers involved in developing theories and approaches for enhancing teaching and learning in mathematics. In discussions about various problems, issues, and curricular approaches, several overarching themes emerged:

Values. Decisions in mathematics about what to teach, when to teach, and how to teach are driven primarily by values, a reality that few acknowledge or recognize. Unlike social studies or language arts, where the influence of values is widely accepted, mathematics seems to carry a veneer of objectivity that often precludes reflective discussion and constructive debate.

Mathematics as a Language. To support and promote mathematical literacy, we must view mathematics as a language with an intricate design, not a series of unrelated procedures and formulas. Mathematics includes both concepts and procedures. A person who is mathematically literate can use those concepts and procedures to solve problems in a variety of situations. This approach is analogous to moving beyond memorization of the rules of English grammar to understanding the subtleties and nuances of conversation and correspondence.

Reciprocal Relationship of Assessment and Instruction. To target and design instruction appropriately, teachers should use a variety of assessment methods to determine the nature and extent of student progress in understanding mathematics.

Integration of Math Concepts and Processes. Teachers should help students learn every area of mathematics in all grades. Instead of addressing algebra only in 8th grade or geometry only in 10th, geometric and algebraic concepts should be introduced in pre-kindergarten, using developmentally appropriate curriculum and instruction. This integration of concepts and topics would revolutionize mathematics curricula and instruction, bringing educators and students closer to using mathematics as a language.

Motivation. Motivation is critical to students' success in mathematics and can be easily undermined. For example, tracking students in mathematics, a frequent (if often disguised) practice, can affect teachers' expectations and students' motivation to work hard and perform at high levels.

Adaptation. Well-designed curriculum materials serve as useful prototypes that can enhance teaching and learning. The question is whether adaptation is beneficial or harmful, as teachers seek to make the curriculum their own.

Learning Communities. Bringing teachers together to learn new approaches to curriculum and instruction, try out new practices, and reflect on student performance is a powerful strategy for professional development.

These key themes served as a structure for the closing session on mathematics and informed the development of the recommendations outlined below.

Research Needs

- ★ Explore strategies for helping parents, teachers, and policymakers understand the role of values in making decisions. How can schools and communities provide structured opportunities for reflection and discussion? How can we help key stakeholders understand the difference between the current working world and the world of work that today's children will confront?
- ★ What curricula, instruction, and assessment best support the teaching of mathematical literacy? Research is needed to answer questions such as: What strategies are successful? What professional development is required to support educators in helping their students become mathematically literate?
- ★ Conduct a longitudinal analysis of the academic achievement of students who have been taught to be mathematically literate based on NCTM's Principles and Standards. In addition, conduct a longitudinal study of the effects of tracking on student achievement in mathematics.
- ★ Explore how institutions of higher education can best prepare preservice teachers to foster mathematical literacy.
- ★ Determine the effects of Universal Design for Learning — designing curriculum, instruction, and assessments in mathematics that are accessible to all students.

As a practical issue, researchers should work with policymakers and educators to make research — both findings and theoretical constructs — accessible to practitioners so they can see the potential implications for practice. Also, research should address all students, including those with disabilities, second language learners, and minority students. Disaggregated data that show results for each group would be invaluable.

Policy Needs

- ★ Broaden the discourse about what it means to be literate and make explicit the values underlying decisions in mathematics. For example, at the local level, such policies could require the district office to allocate time for educators, parents, and community members to discuss what students should know and be able to do in mathematics.

- ★ Encourage professional development in promoting mathematical literacy. For example, educators need support in looking at student work as a tool for analyzing what students are actually learning.
- ★ Promote student assignment patterns other than tracking. Encourage integration of mathematical concepts and procedures across the K–12 pathway
- ★ Engage in communication and marketing practices that educate policymakers, parents, educators, and students about mathematical literacy, integration, motivation, and other timely issues.

Professional Development

The performance of middle-level teachers in this country is inhibited by the lack of high-quality preservice and by the plight of professional development in general. A consensus is emerging: The "old" days of periodic, hit-or-miss professional development must be left behind. We must embrace new, integrated strategies that provide educators with both content knowledge and pedagogy if we want to produce results for young adolescents. Discussion about new strategies for professional development touched on several key themes.

Current research in education argues that teacher expertise is one of the most important factors in determining student achievement. In order for middle grades teachers to be effective, they need content background (what to teach) and pedagogical knowledge (how to teach). Additionally, teachers need to be trained and certified in the subject areas that they will be responsible for teaching. There are a significant number of middle grades teachers teaching outside their preservice area of training (this is particularly true for mathematics and science). Finally, middle grades teachers require specialized preparation and training to deal with the unique needs of young adolescents. These teachers need to understand and appreciate the social, emotional, and cognitive needs of middle grades students.

Networking. We must create collaborative learning environments that bring together educators, students, and community members.

A Culture of Learning. We must build a culture of learning by providing more time within the school day for reflection and collaboration (i.e., job-embedded professional development). The focus of teachers' time together should be on improving teaching and assessing student learning.

Continuum of Professional Development. We must consider professional development as a continuum that encompasses preservice education, licensure, induction, ongoing professional development, and advanced certification.

Teachers at the Center of Their Own Learning. To ensure quality, teachers need to be involved in all aspects of professional development. Furthermore, inservice education should be job-embedded, including ongoing learning, action, and reflection.

Professional Development is also a central feature of comprehensive school reform. Schools must take into account individual needs and school priorities. The "content" of professional development should encompass at a minimum: (a) knowledge of young adolescents, (b) knowledge of subject matter, (c) developmentally appropriate curriculum, instruction, and assessment, (d) meeting the needs of diverse learners, (e) integration of technology.

Focus on Results. Professional development should not be measured by "seat time" or courses taken, but rather on changes in teacher behavior and student results.

School-University Partnerships. Schools and universities must work closely together to ensure that both preservice education and ongoing professional development support teachers' growth and efficacy.

Research Needs

- ★ Discover what works, and what doesn't. Well-designed studies of professional development, models and strategies will benefit middle grades teaching and learning. We must evaluate both the quality of staff development and its impact on teacher behavior and student learning. To date, there is very little good research to demonstrate a link between quality professional development and student achievement.
- ★ Develop a deeper understanding of the professional development needs and strategies specific to the middle grades.
- ★ Examine the impact of middle grades licensure on teacher performance and student success. What types of preservice programs are likely to have the greatest impact?
- ★ Conduct research on the role of teacher leaders and learn more about their responsibilities, and impact.
- ★ How can we learn from successful schools and districts that foster continuous learning? Conduct in-depth studies of such schools and share results widely.

Policy Needs

- ★ Expand opportunities for teachers to embrace new behaviors and practices. They need dedicated time for discussion, practice, reflection, and refinement, as well as opportunities to see beyond their own classrooms and learn from one another.
- ★ Making sure that the content of professional development focuses on academic excellence, developmental responsiveness, and social equity. Political pressures — not educational expertise — often determine aspects of content.
- ★ Share and incorporate known, effective practices into the everyday life of schools. Teachers need to have research-based knowledge of best practices, and then they need assistance in making the practices their own. This cannot be left to chance.
- ★ Secure a place for professional development as a continuous part of every professional's on-going plan for improvement. Learning must continue throughout the life of educators, and more schools must build cultures that foster that approach.
- ★ Develop and implement certification standards at the preservice level (i.e., universities and colleges) specific to middle grades education.

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WHERE ARE WE NOW? TAKING STOCK OF MIDDLE GRADES EDUCATION

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Keynote Address

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Executive Summary

Beginning in the 70s and gaining momentum through the 80s and 90s, middle grades reform has ascended as a priority — even a linchpin — in the nation's education goals. Several influential publications have helped pave the way; for example, *Successful Schools for Young Adolescents* (Lipsitz, 1984), *This We Believe* (NMSA, 1982), *Turning Points* (Carnegie Corporation, 1989), and *Caught in the Middle* (California Department of Education, 1987). All have contributed to a clear vision: high-performing schools are academically excellent, developmentally responsive, and socially equitable. Such schools ensure the academic learning and healthy development of all their students.

At first glance, the middle grades reform movement is energized, growing, and seems to be showing modest overall gains. A closer inspection of assessment data through the last three decades, however, reveals little change in student performance. In most subjects, racial gaps are widening. Yes, on the whole, students exiting middle school know and can do a bit more than their predecessors in the early 80s. Virtually all of the improvement we see, however, appears to be attributable to gains in the early elementary years. While they exit the middle grades with somewhat higher skills, many young adolescents are without the skills necessary for high school success — and well below their counterparts in other nations.

This paper provides an overview of national data and international data on the results and practices of middle grades education. It also identifies schools and strategies that are bucking the downward trends. Part One provides a summary of results over time; it focuses not just on students in general, but also on what we know about achievement patterns for different racial and economic groups. Part Two examines what we know about the practices associated with improved results. Part Three shares some examples of states, districts, and schools that are showing good results. Part Four describes what high-performing middle grades schools look like.

Part One
A Look at Results

While middle-school graduates today know more in core academic subject areas than did their predecessors in the 70s, striking disparities exist among subjects, as well as among students of different racial and economic backgrounds.

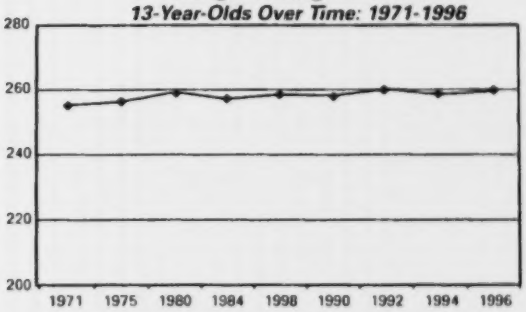
Achievement in Subjects

- ★ In reading, eighth grade students — the only middle grade level for which national achievement data are consistently available — improved slightly during the 70s, but then plateaued through the 80s and 90s. By the end of the 90s, eighth grade reading was at the 1980s level, only slightly better than where it was in the early 70s (see Figure 1, p. 42).
- ★ In mathematics, middle grades students made slight advances during all three decades. Students today are performing above their predecessors in both the 70s and 80s, gaining the equivalent of about two-thirds of a grade level during this period (see Figure 2, p. 42).
- ★ Science performance is perhaps the oddest case of all: students declined during the 70s, gained during the 80s, and declined again during the 90s (see Figure 3). The net effect has been little or no improvement on student science scores from the 70s to the 90s (see Figure 3, p. 42).

Patterns by Race

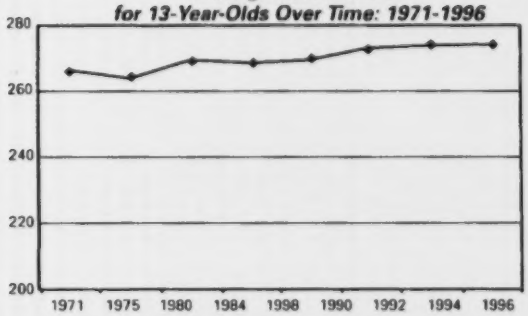
When the data are disaggregated by race, the overall pattern is indisputable. Minority students made real progress during the 70s and early 80s, substantially narrowing the gap separating them from other young Americans. In the 90s, however, that gap grew wider again.

FIGURE 1.
Average Reading Scores for 13-Year-Olds Over Time: 1971-1996



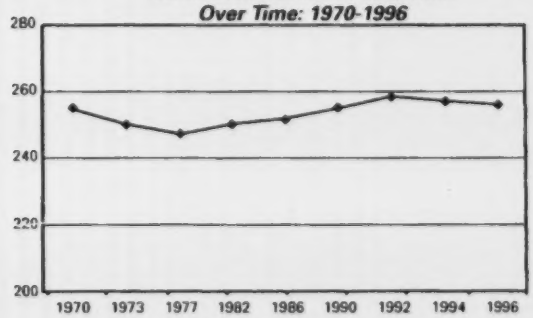
Source: NAEP 1996 Trends in Academic Achievement, 2000 by The Education Trust, Inc.

FIGURE 2.
Average Math Scores for 13-Year-Olds Over Time: 1971-1996



Source: NAEP 1996 Trends in Academic Achievement, 2000 by The Education Trust, Inc.

FIGURE 3.
Science Scores for 13-Year-Olds Over Time: 1970-1996



Source: NCES by The Education Trust, Inc.

★ **Reading**. Between 1975 and 1988, African American and Latino students significantly improved their skills. Indeed, during that period, the gap between African American and white eighth graders declined by about half and the gap between Latinos and whites — which was a bit smaller to begin with — declined by about one third. Beginning in 1990, however, the gap began to widen again. Reading performance among white students began to increase, while performance among African American and Latino students declined. The downward trend turned around again in 1994, with results improving for all groups since that time. The gap between groups, however, still remains substantially larger at the eighth grade level than it was a decade ago (see Figure 4).

★ **Mathematics**. Between 1973 and 1986, African American and Latino eighth graders made significant gains in mathematics knowledge, while performance among white students remained essentially flat. During this period, the gap between African Americans and whites declined by about half, the gap between Latinos and whites by a little bit less. Progress in narrowing the gap stopped in 1986, however, with no significant reductions in the years since that time. All three groups were doing slightly better in 1996 than 10 years earlier, but the gains among white eighth graders were larger (see Figure 5).

★ **Science**. Between 1977 and 1990, students in all three groups improved their performance in science. The gains among African Americans and Latinos, however, were considerably larger than those among white students, so the gap between groups narrowed — though not nearly as much as in other subjects. The gap between groups widened slightly during the 90s (see Figure 6).

Proficiency Levels at the End of the 90s

By the end of the 90s, virtually all eighth graders could carry out simple reading and mathematics tasks and understand very basic scientific procedures. Many, however, could not complete the more complex tasks expected of the age group. Less than one third of all students reached the proficient level in any academic subject. Among minority students, the numbers were worse.

★ **Reading**. About one third of middle school graduates reached the proficient level in reading. Strikingly different patterns emerged, however, for students of different races. Approximately four in ten white and Asian eighth graders scored at or above the proficient level. Among African Americans, the number dropped to one in eight;

among Latinos, the number was one in six. Many Latinos and African Americans did not even reach the basic level. Almost half of Latino and African American eighth graders read below the basic level. Among whites and Asians, the number below basic was less than one in five (see Figure 7, p. 44).

★ **Mathematics**. In mathematics, about one in four students reached the proficient level. But the numbers differed markedly among the races, with about one in three white students, one in eleven Latinos, and one in 25 African American students at or above proficient. At the opposite end of the spectrum, about four in ten eighth graders did not reach even the basic level. Again, however, the numbers below basic differ markedly among the races, with about one in four whites, six in ten Latinos, and seven in ten blacks below basic (see Figure 8, p. 44).

★ **Science**. In science, the performance of whites and Asians is similar: approximately one third at or above proficient, one-third at basic, and one-third below basic. Once again, however, significant differences occur among the races. Among African American students, for example, only one in twenty perform at or above proficient, while more than three-quarters perform below basic. Among Latinos, about one in nine perform at or above proficient, and two-thirds perform below basic (see Figure 9, p. 44).

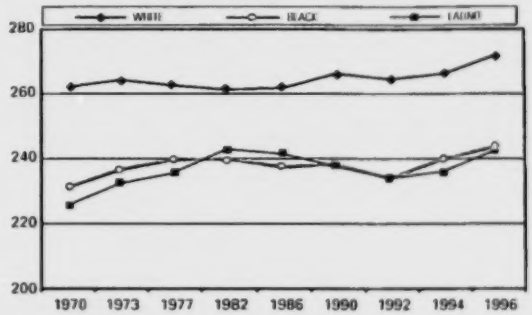
Growth between Grades 4 and 8

Though some are clearly struggling, today's eighth graders nevertheless are performing somewhat better than did their counterparts during the 70s and 80s. It is important to ask how much — if any — of this improvement can be attributed to improvements in middle grades (or even upper elementary) education. How much can be attributed to earlier dramatic increases in kindergarten and preschool attendance and upgraded elementary school programs? The answers are sobering.

Figure 10 (p. 45) shows the gains between grades 4 and 8 made by students in several different time periods. As is evident in those displays, student achievement grows in reading, writing, mathematics, and science between grades 4 and 8. The growth is biggest in writing, and smallest — by a long shot in science.

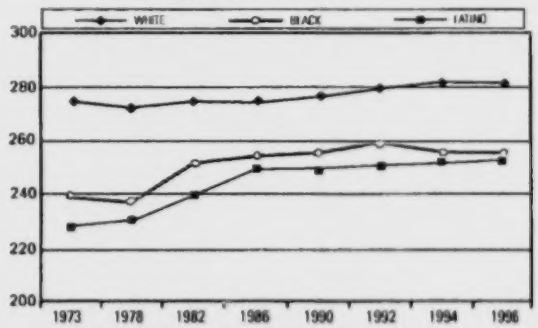
However, the "value added" in grades 5-8 has actually declined over time in mathematics, remained stagnant in reading, and declined in science (see figures 11, 12, (p. 44)

FIGURE 4.
Average 8th Grade Reading Scores by Race: 1975-1998



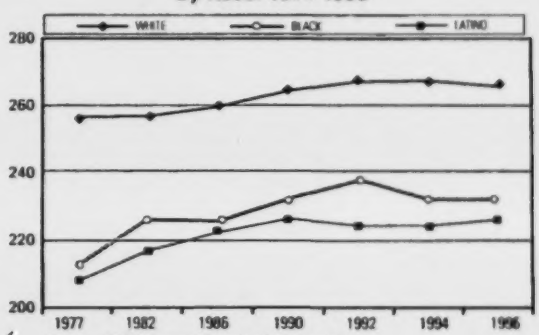
Source: NCES Conditions of Education 1999; 2000 by The Education Trust, Inc.

FIGURE 5.
Average Math Scores for 13-Year-Olds by Race: 1973-1996



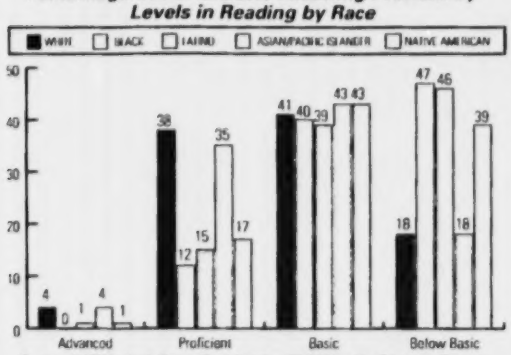
Source: NCES Digest of Education Statistics 1997
2000 by The Education Trust, Inc.

FIGURE 6.
Average Science Scores for 13-Year-Olds by Race: 1977-1996



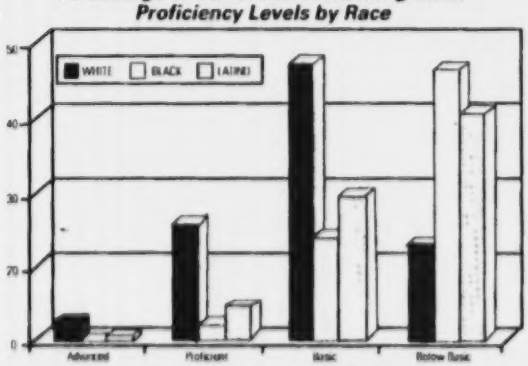
Source: NCES Digest of Education Statistics 1997
2000 by The Education Trust, Inc.

FIGURE 7.
Percentage of 8th Graders Attaining Proficiency Levels in Reading by Race



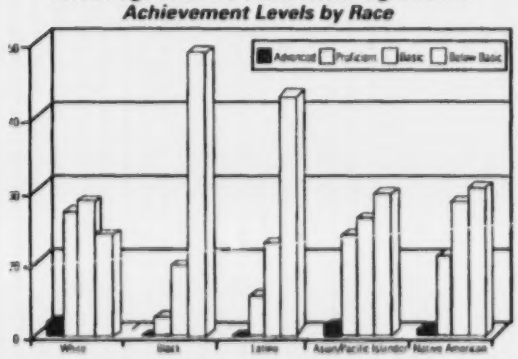
Source: NAEP Nation's Report Card, Reading '98 2000 by The Education Trust, Inc.

FIGURE 8.
Percentage of 8th Graders Attaining Math Proficiency Levels by Race



Source: NAEP Nation's Report Card, Reading '98 2000 by The Education Trust, Inc.

FIGURE 9.
Percentage of 8th Graders Attaining Science Achievement Levels by Race



Source: NAEP Nation's Report Card, Reading '98 2000 by The Education Trust, Inc.

and Figure 13 (p. 46)). All of the growth in eighth-grade achievement in the core subjects, then, is attributable to better preparation in grade 4 and below. In other words, reforms at the middle level have not produced more growth in student learning to date. On the contrary, the data seem to reveal that reforms have had little or no effect on reading achievement, and perhaps a negative effect on mathematics and science learning.

International Comparisons

Many Americans — and many middle grades educators — wouldn't be terribly surprised by these data. They've succumbed to a widespread view that young adolescents are incapable of sustained intellectual activity, at least in part because of "raging hormones." In other countries, however, young adolescents are expected to make considerably more progress — and they do so with great regularity.

These differences are clear in Figures 14 and 15 (p. 46), where we have compared the performance of American students in science and mathematics at three benchmark grade levels to that of their counterparts in other developed and developing nations. As is clear in these displays, American students do relatively well in both subjects at grade 4 — near the top of the pack in science and in the upper middle tier in mathematics. By eighth grade, however, their relative position has fallen rather dramatically. This relative decline is not because they showed no growth, but because their counterparts made considerably more during grades 5 through 8.

Part Two
What Do the Data Tell Us about the Practices Associated with Higher Achievement?

Research in American schools and comparisons to other countries clearly reveal a handful of practices that improve middle grades achievement: rigorous curriculum for all, high expectations, improved teacher qualifications, and adequate materials.

Rigorous Curriculum

In high school data, it has been clear for some time that students who take more rigorous courses perform at higher levels, no matter what test is used. A similar pattern seems to exist at the middle grade level (comparisons in math are most reliable, because course titles are more uniform and less ambiguous across the grades).

Figure 16 (p. 47) presents data from the National Assessment of Educational Progress (NAEP) on eighth graders who are taking different levels of mathematics, from general mathematics

through algebra. Clearly, students in the more rigorous courses perform at higher levels on NAEP than students in the basic courses. Some would argue the causality of these relationships; in most schools, students have to be scoring higher to be placed in the more difficult courses to begin with. While this is undoubtedly true, careful research shows very clearly the positive impact of more rigorous coursework on even traditionally low-achieving high school students. For example, vocational students who are required to complete college prep courses do better on reading and mathematics assessments than students without the requirement. And low-achieving high school students assigned to chemistry and physics courses show accelerated growth in science knowledge. Unfortunately, few high schools seem to be acting on this research. In science, for example, when compared with high achievers, low-achieving eighth graders are:

- ★ five times more likely to take fewer than two years of high school science;
- ★ one fourth as likely to take four years of high school science;
- ★ one third as likely to take chemistry; and
- ★ one fourth as likely to take physics.

In other words, instead of providing more content, we seem to be giving our lowest achieving students less.

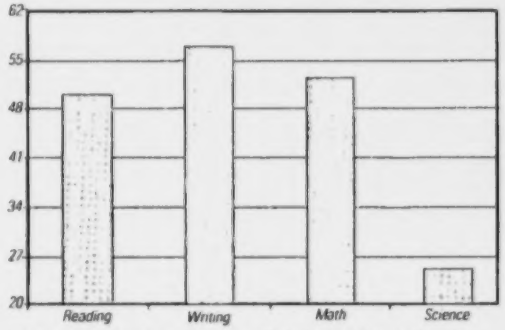
These curricular differences appear to explain at least part of the achievement differences between students of different races. Figure 17 (p. 47) shows that in mathematics approximately 27 percent of white eighth graders are enrolled in algebra, compared to only 20 percent of African Americans and Latinos. The patterns are similar for pre-algebra, while in general eighth-grade mathematics classes, the pattern reverses, with African Americans and Latinos overrepresented.

Challenging Lessons and Assignments

Researchers in both the U.S. and overseas have amassed considerable evidence on the critical importance of high expectations — in the form of challenging lessons and assignments. Indeed, one need not look far in national achievement data to see ample reminders of the relationship between more rigorous assignments and student achievement.

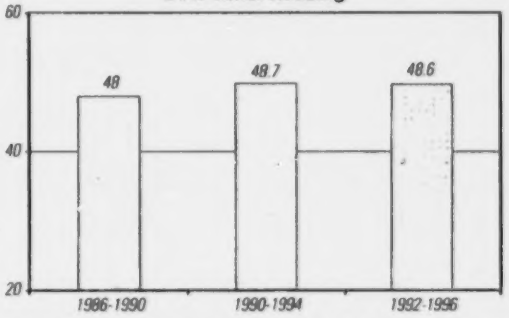
- ★ **Mathematics**. Figures 18 (p. 47) and 19 (p. 47) show the relationship between instructional focus and achievement in mathematics: the more focus on higher order thinking, the higher the student scores — and the reverse is true of an emphasis on simple memorization. Homework, too, seems to matter: the higher achieving

FIGURE 10.
Academic Growth Grades 4-8



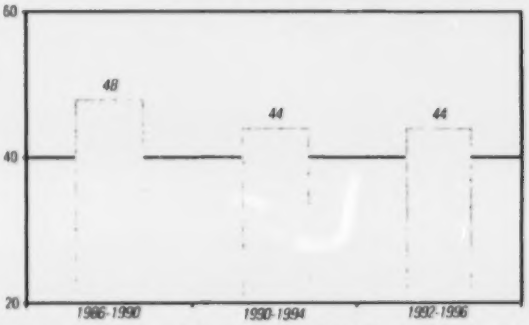
Source: NCES Conditions of Education 1999; 2000 by The Education Trust, Inc.

FIGURE 11.
Academic Growth from 4th to 8th Grade Over Time: Reading



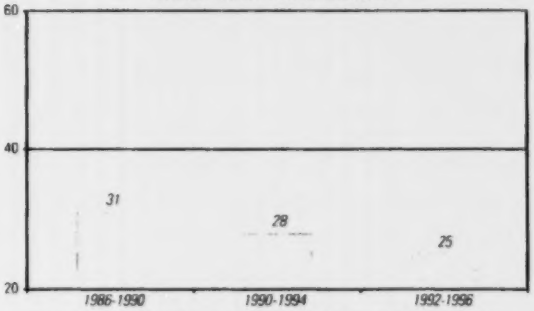
Source: NCES Digest of Education Statistics 1997; 2000 by The Education Trust, Inc.

FIGURE 12.
Academic Growth From 4th to 8th Grade Over Time: Math



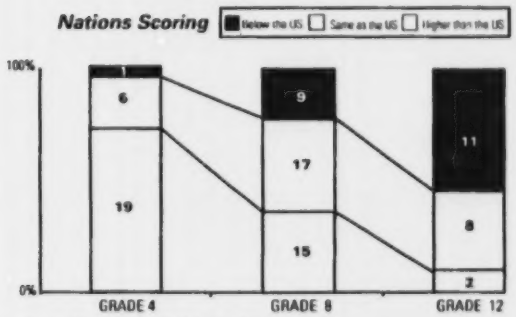
Source: NCES Digest of Education Statistics 1997; 2000 by The Education Trust, Inc.

FIGURE 13.
Academic Growth From 4th to 8th Grade Over Time: Science



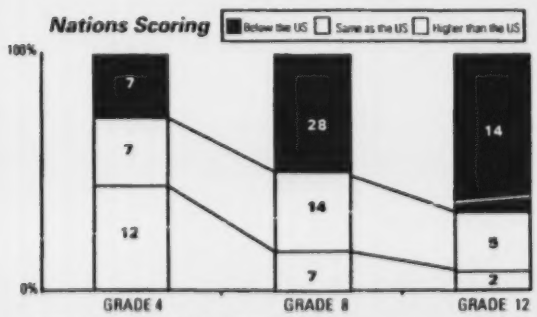
Source: NCES Digest of Education Statistics 1997; 2000 by The Education Trust, Inc.

FIGURE 14.
Nations' Average Science Performance Compared with the U.S.



Source: NCES 1999-081R, Highlights From TIMSS

FIGURE 15.
Nations' Average Mathematics Performance Compared with the U.S.



Source: NCES 1999-081R, Highlights From TIMSS

students do considerably more (see Figure 20, p. 48). And despite the importance of strong content, U.S. schools do not perform well on this measure in international studies. In mathematics, more than 80 percent of eighth grade lessons in the U.S. were rated as low on content, while fewer than 30 percent of German lessons and fewer than 10 percent of Japanese lessons were similarly rated (see Figure 21, p. 48).

★ **Science.** In science, the data point in similar directions. Instruction focused on problem solving (see Figure 22, p. 49) produces higher scores, while students whose teachers focus primarily on memorization (see Figure 23, p. 49), score less well. Homework contributes to science achievement as well (see Figure 24, p. 49).

★ **Reading and Writing.** American middle grades students do surprisingly little reading in school and for homework. Only about one in seven read more than 20 pages per day, with about the same number reading 16 to 20 pages. Interestingly, more 9-year olds than 13-year olds read this many pages a day. At the other end of the spectrum, more than half of all 13-year olds read 10 or fewer pages per day for school — including one in four who reads fewer than five pages (see Figure 25, p. 50). The data on writing assignments show equally lax expectations. Far more students have no writing assignments during a given week than have one or more such assignments (see Figure 26, p. 50).

Well-Educated Teachers

Middle grades students need teachers who have deep knowledge of their subject. However, middle grades teachers often lack a strong subject background. Although the problem is worse in mathematics and science, it is also pronounced in English and social studies.

★ **Mathematics.** Students whose teachers hold a teaching credential perform considerably higher than those whose teachers are uncertified (see Figure 27, p. 50). The teacher's major in college makes a difference as well, with students taught by mathematics majors outperforming those taught by others — including education majors. Both of these relationships hold true even within courses of the same name. For example, students taught algebra by uncertified teachers perform considerably below those taught the same subject by certified teachers. Likewise, students taught algebra (or, for that matter, pre-algebra or general mathemat-

ics) by mathematics majors outperform those taught the same classes by other majors. In general, students in the lower level courses are more often taught by the non-mathematics majors, with the mathematics majors more likely to be teaching the higher level courses (see Figure 28, p. 51).

★ **Science**. As with mathematics, teacher background makes a difference in student achievement in science. In general, students taught science by uncertified teachers perform below those taught by certified teachers, and those taught by science majors do better than those taught by education or other majors (see Figures 29 and 30, p. 51). Even if non-science majors could be trained in science content to improve their teaching, very few participate in professional development in science (see Figure 31, p. 52).

Across all subjects, the patterns are very clear. Poor students, minority students, and lower achieving students of all races are far more likely than other students to be taught by undereducated teachers. Basically, the pattern is a simple one: we take the students who are most dependent upon their teachers for academic learning and assign them teachers with the weakest academic base (see Figures 32, 33, (p. 52) and 34 (p. 53)).

Adequate Instructional Resources

In addition to having better-educated teachers, high-achieving students are more likely to attend schools where teachers have the textbooks, laboratory supplies, computers, and other instructional aids that they need. On the whole, students in well-resourced classrooms perform better than those in under-resourced classrooms (see Figure 35, 36, (p. 53) and 37 (p. 54)).

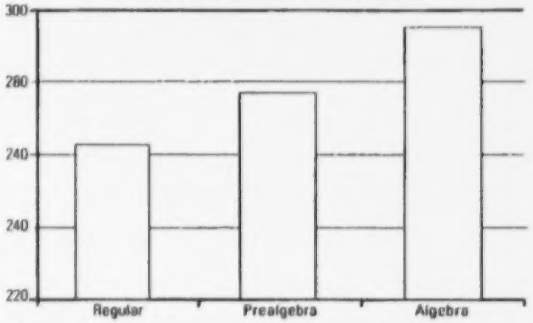
Part Three
Schools with Promising Results

The story is not altogether bleak. A number of middle grades schools across the country are making progress in accelerating learning for all students. For example, in a report commissioned by the National Educational Goals Panel, Grissmer and Flanagan (1998) find that students in both North Carolina and Texas have made rapid achievement gains based on both the National Assessment of Educational Progress (NAEP) and state assessments. These gains are both significant and sustained, and they hold true across subjects and grade levels.

Gains at the State Level

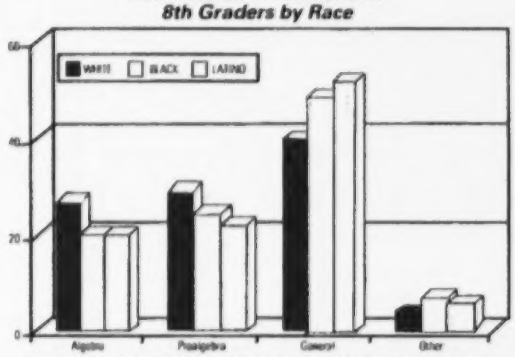
From 1992-1998, North Carolina students made significant gains in both reading and mathematics at each grade level from

FIGURE 16.
Average math Scores for 8th Graders Enrolled in Selected Math Courses 1996



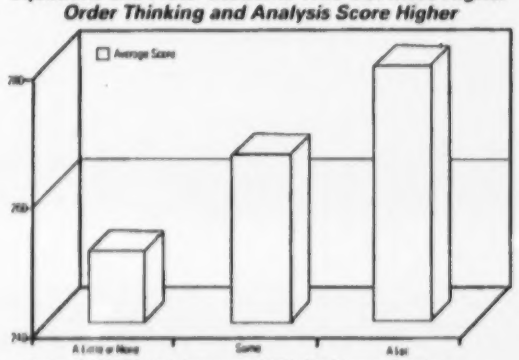
Source: NAEP 1996 Trends in Academic Progress; 2000 by The Education Trust, Inc.

FIGURE 17.
Math Course Enrollment for 8th Graders by Race



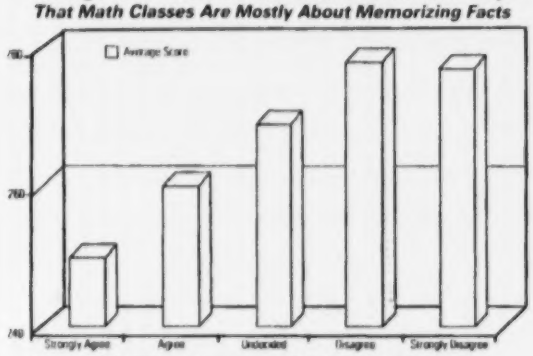
Source: NAEP Nation's Report Card, Reading '98, 2000 by The Education Trust, Inc.

FIGURE 18. Connect-the-Dots or Equations and Plots: Students Who Get More Higher Order Thinking and Analysis Score Higher



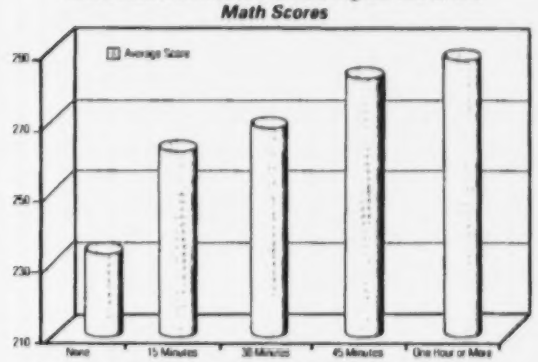
Source: NAEP 1996 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 19.
Average Math Scores for 8th Grade Students Who Say That Math Classes Are Mostly About Memorizing Facts



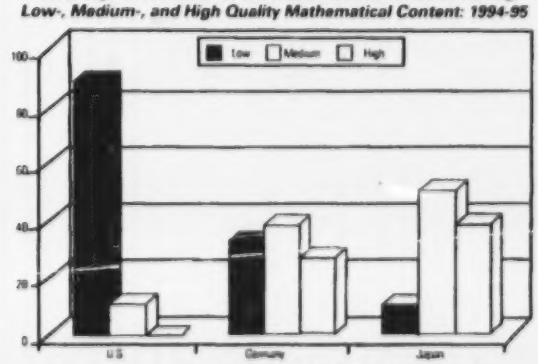
Source: NAEP 1998 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 20.
More Math Homework Means Higher 8th Grade Math Scores



Source: NAEP 1998 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 21. ***International Comparison: Percentage Distribution of 8th Grade Lessons Rated as Having Low-, Medium-, and High Quality Mathematical Content: 1994-95***



Source: NCES Conditions of Education 2000, 2000 by The Education Trust, Inc.

grade 3 to grade 8, although the gains in mathematics were larger than those in reading. The scores show gains of .1 to .35 standard deviations in reading scores across the grades, and .2 to .5 standard deviations in mathematics (see Figures 38 and 39, p. 54). According to the authors, this means that students in 1997/98 would score, on average, about 8–9 percentile points higher than their counterparts in 1992-93.

Figures 40 and 41 (p. 55) present the results from the Texas state assessments from 1994 to 2000. The results show large gains in both reading and mathematics for eighth graders. Similar patterns hold for sixth and seventh graders. Although the percentage of white eighth graders passing the Texas Assessment of Academic Skills in reading improved from 86 percent to 95 percent, the results show even larger gains for Latino and African American students. Whereas 55 to 62 percent of African American and Latino students passed the state reading assessment in 1994, fully 85 percent of both groups passed in 2000. Thus, the achievement gap between the white students and their peers has narrowed significantly during this time period. The results in mathematics are even more dramatic. The percentage of white students passing the state mathematics assessment increased from 70 to 95 percent, while the percentage of Latino and African American students passing more than doubled (from 40 to 85% and from 32 to 81%, respectively).

Both Texas and North Carolina also made the largest average gains in the nation on the seven state NAEP assessments given from 1990 to 1996 (Grissmer and Flanagan, 1998). When the seven NAEP scores were compared for each racial/ethnic group, white, black, and Latino students in Texas ranked above the average for all states. (Scores for each racial/ethnic group in North Carolina continued to rank at or below the cross-state average, however.) According to the authors, these sizeable gains were due primarily to business and political leadership which helped to create and sustain the following state reform policies:

- ★ Setting state-wide academic standards by grade level to establish clear teaching objectives;
- ★ Holding all students to the same high standards;
- ★ Conducting statewide assessments closely linked to the academic standards;
- ★ Creating accountability systems with clear consequences for results;
- ★ Increasing local flexibility for administrators and teachers in meeting the standards;
- ★ Providing computerized feedback systems, including

data for continuous improvement;

- ★ Shifting resources to schools with more disadvantaged students; and
- ★ Creating an infrastructure for reform.

Kentucky's state assessment data lend additional support to these findings. In this state, which also places a heavy emphasis on high standards, statewide assessment, and school-level accountability, middle grades student performance increased dramatically from 1993 to 1998. For example, the Kentucky Instructional Results Information System reading index (a weighted average of the number of students meeting different levels of proficiency) increased from 38.4 to 47.0, while the mathematics index increased from 22.8 to 51.4 during this time period. Furthermore, NAEP data confirm a significant increase in eighth-grade mathematics performance from 1992-1996 (Kentucky Department of Education, 2000).

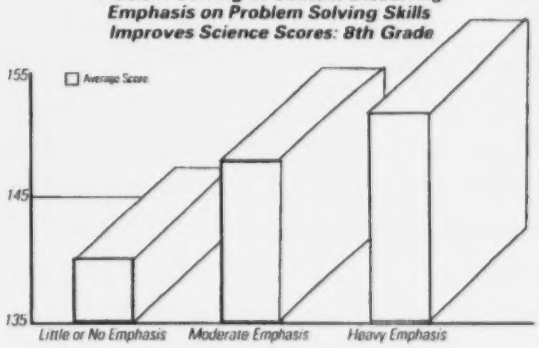
Gains at the District Level

In addition, a number of large urban school systems have seen significant improvement in student achievement. Many schools in Long Beach, Corpus Christi, San Diego, and Louisville (who receive support from the Edna McConnell Clark Foundation's Program for Student Achievement) can point to substantial improvements in student performance.

According to data supplied by Policy Studies Associates, the program's independent evaluator, participating districts made substantial gains in reading over the last three years. In Louisville, Long Beach, and San Diego, the proportion of students who scored at or above the Basic level in 2000 was larger than the proportion who attained that level in 1998, by an average of almost five percentage points. In those same districts, the proportion of test-takers scoring at the two highest levels of performance (Proficient and Advanced) also increased, by almost six percentage points. In mathematics, there was little change in the proportion of students scoring at each performance level in Long Beach or Jefferson County, the two districts for which data were available.

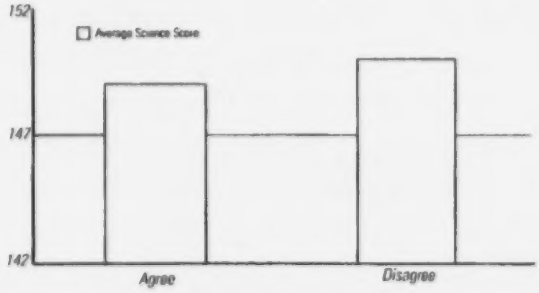
According to data collected by San Diego's Office of Standards, Assessment, and Accountability, the percentage of students who scored at or above the 50th percentile (the national average) in reading jumped four points, from 43 to 47 on the SAT-9. Since San Diego students first took the test in 1998, scores in reading have increased a total of six points. The district also saw good gains in mathematics, with 54 percent of the middle grades students scoring above the 50th percentile. This represents a five-point improvement over 1999 and a nine-point improvement

FIGURE 22.
Problem Solving or Content Dissolving: Emphasis on Problem Solving Skills Improves Science Scores: 8th Grade



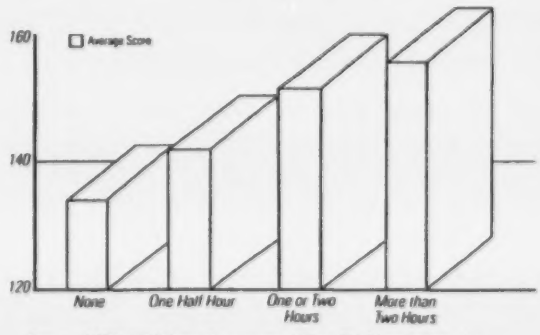
Source: NAEP 1996 Science Assessment, 2000 by The Education Trust, Inc.

FIGURE 23.
Average Science Scores for 8th Grade Students Whose Classes, They Say, Are Mostly About Memorization



Source: NAEP 1996 Science Assessment, 2000 by The Education Trust, Inc.

FIGURE 24.
Weekly Science Homework and 8th Grade Science Scores



Source: NAEP 1996 Science Assessment, 2000 by The Education Trust, Inc.

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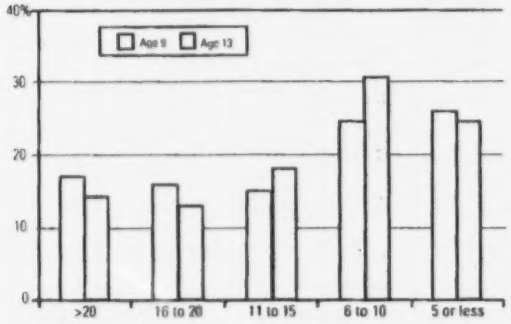
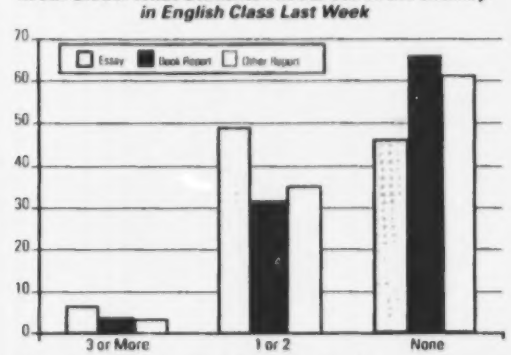
FIGURE 25.
Pages Read in School and For Homework 1996: Age 9 v. Age 13



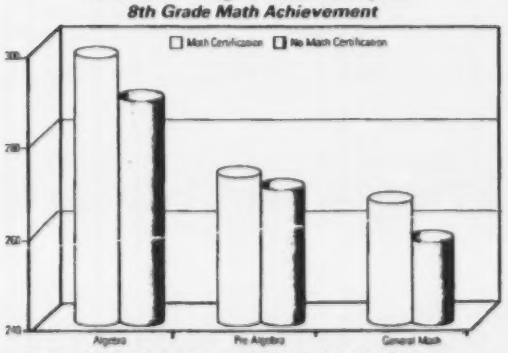
Source: NAEP 1996 Trends, 2000 by The Education Trust, Inc.

FIGURE 26. Type and Frequency of Writing in 8th Grade: What Students Across Did in the Country in English Class Last Week



Source: NAEP 1996 Trends, 2000 by The Education Trust, Inc.

FIGURE 27.
Areas of Teaching Certification Impacts 8th Grade Math Achievement



Source: NAEP 1998 Math Assessment, 2000 by The Education Trust, Inc.

over 1998. At 11 of the 26 middle grades sites, 50 percent or more of fluent-English students achieved the 50th percentile or above (the District Accountability System's six-year goal) in all three SAT 9 subject areas (total reading, language, total mathematics). Three middle schools in particular, Farb, Keiller and Roosevelt, demonstrated strong percentile gains in Total Reading and Language, while maintaining or making slight gains in Total Mathematics.

In Long Beach, although district and school averages are generally low on the SAT-9, in 1999 scores at six of the district's middle grades schools were consistently high, regardless of the test or content area. Four of these six schools have high concentrations of students from low-income families (45% or more), while three have more than 30 percent limited English proficient students. Moreover, according to an independent analysis conducted by Policy Studies Associates, Inc., approximately half of the students in Long Beach middle schools can meet NAEP's level of proficiency in both reading and mathematics, despite the fact that its students are far poorer than the national average (Changing Schools in Long Beach, Spring 2000).

Gains by Schools

Under the sponsorship of the W.K. Kellogg Foundation, hundreds of urban and rural middle grades schools are striving to improve the life chances of young adolescents from low-income families. For example, Michigan Middle Start began with a long-range goal of improving educational programs and learning environments for middle grades students. It has since expanded to encompass three states in the Mid South: Arkansas, Louisiana, and Mississippi. All grantee schools in the South are located within the Delta region and have at least 40 percent of students eligible for free or reduced lunch.

According to the program's evaluators, Middle Start has demonstrated positive outcomes for both students and schools:

- ★ Students show improvement in academics as well as behavior and attitude.
- ★ In Michigan Middle Start schools, student reading and mathematics scores on the Michigan Educational Assessment of Progress (MEAP) test indicate greater progress than those of students in comparable non-grantee schools.
- ★ Teachers in Middle Start schools also report better classroom behavior among students. And, in surveys, students show evidence of improved attitudes — stating, in fact, that they believe if they try harder, they will succeed in school (AED, 1998; Mertens, Flowers, and Mulhall, 1998).

Teachers and administrators in Middle Start schools link team teaching and common planning time to improved student performance. Michigan Middle Start grantee schools using both team teaching and common planning time saw the percentage of "satisfactory" scores in reading increase from 17 to 31 percent in only two years. In math, "satisfactory" scores jumped from 24 to 33 percent in the same period (Mertens, Flowers, and Mulhall, 1998).

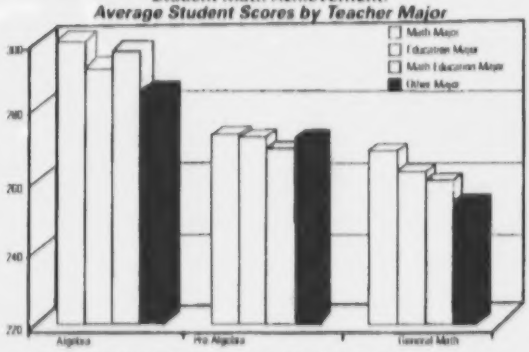
Still other middle grades schools representing 15 different states have made fundamental changes in their organizational structure and instructional practice, using the recommendations from Carnegie Corporation's *Turning Points* (1989) as their guide. Early research findings suggest that the more these schools implement the features of high-performing middle grades schools, the better their students perform on standardized tests of achievement (Felner, Jackson, Kasak, Mulhall, Brand, and Flowers, 1997). For example, schools with interdisciplinary teams and common planning time tend to do better than those without them. Lessons learned from these schools will soon be available in *Turning Points 2000: Educating Young Adolescents in the 21st Century* (In Press).

Part Four
What Do High-Performing Middle Grades Schools Look Like?

The above data suggest that some states, districts, and schools are achieving success with middle grades students. What do high-performing middle grades schools look like in practice? According to the National Forum to Accelerate Middle grades reform, a group of 43 educators dedicated to improving schools for middle grades students across the country, excellent middle grades schools have a common vision that drives every facet of the school improvement program. Drawing on theory, research, and best practice, the members of the National Forum assert that such schools focus on three interrelated priorities: academic excellence, developmental responsiveness, and social equity. (See the National Forum's vision statement, *www.mgforum.org*.)

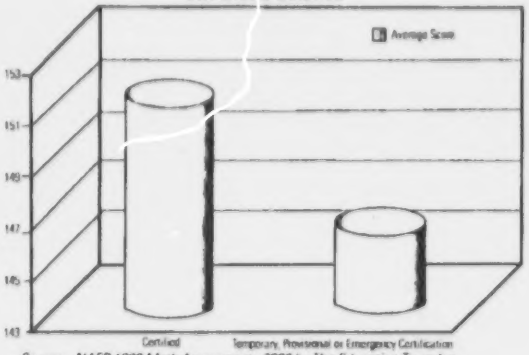
Being an academically excellent school means that all students are learning to use their minds well in challenging classrooms whose curriculum, instruction, and assessment help all students meet rigorous academic standards. But such schools are also responsive to the unique developmental needs of young adolescents. They recognize that early adolescence is characterized not only by dramatic physical, social, and emotional growth, but also by cognitive growth, which allows students to think in more abstract and complex ways. High-performing middle grades

FIGURE 28. Even in the Same Courses, Teacher Preparation Has a Major Impact on 8th Grade Student Math Achievement: Average Student Scores by Teacher Major



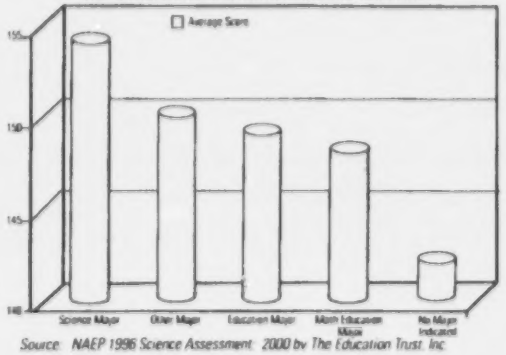
Source: NAEP 1998 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 29. Type of Credential Held by Teacher Holds a Heavy Hand in Student Achievement: 8th Grade Science



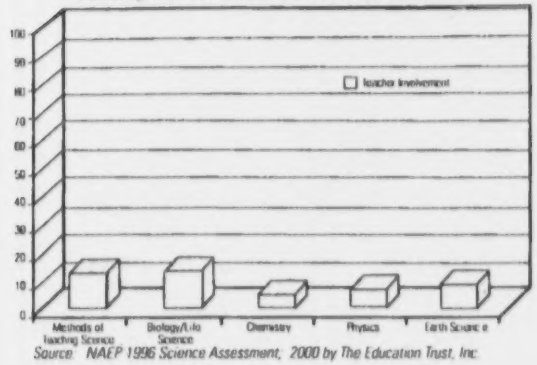
Source: NAEP 1996 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 30. Teacher Majors Play a Major Role in Determining 8th Grade Student Achievement: Science



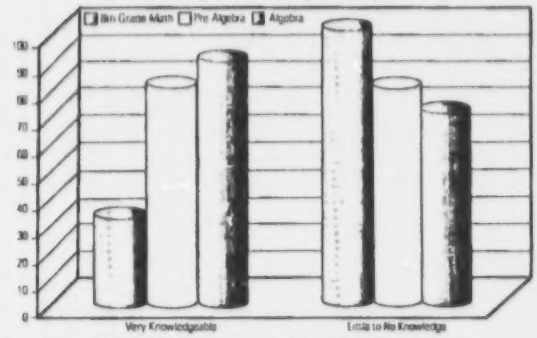
Source: NAEP 1996 Science Assessment, 2000 by The Education Trust, Inc.

FIGURE 31. Percentage of 8th Grade Science Teachers Involved Over the Past Two Years in Professional Development in Science or Science Education



Source: NAEP 1996 Science Assessment, 2000 by The Education Trust, Inc.

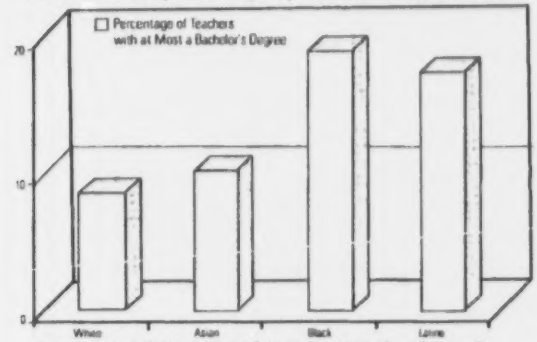
FIGURE 32. Percentage of 8th Graders in Selected Math Courses Being Taught by the Best Prepared Teachers v. Those Being Left Unprepared by the Worst



Source: NAEP 1996 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 33. 6 Degrees of Deprivation.

California: African American and Latino Students in 6th - 8th Grade More Likely to be Taught by Less Qualified Teachers 1997



Source: Julian R. Beth, Kim Reuben & Agnes Danenberg, "Equal Resources? The Distribution of School Resources and Student Achievement in California," Public Policy Institute of CA, p. 87. 2000 by The Education Trust, Inc.

schools are also social equitable, democratic, and fair. They provide every student with high-quality teachers, resources, learning opportunities, and supports. They keep positive options open for all students. The National Forum has identified 37 criteria that reflect its vision of high performing middle grades schools.

It is not difficult to find middle grades schools that are developmentally responsive or schools with a strong academic focus. All too often, however, these schools overlook social equity, by providing a challenging curriculum to some students and a watered-down curriculum to others. It is extremely difficult to find schools that excel in all three areas. Both the National Forum's Schools to Watch (STW) Committee and the Beacons of Excellence Project used a rigorous nomination, application, and selection process to identify promising middle grades schools that meet these criteria. Such schools submitted written applications, were the subject of intensive site visits, and provided state and/or local achievement data demonstrating improved student performance over time.

The STW Committee identified four such schools: Barren County Middle School in Glasgow, Kentucky; Thurgood Marshall Middle School in Chicago; Jefferson Middle School in Champaign, Illinois; and Freeport Intermediate School in Freeport, Texas. These schools are demographically diverse, representing a small, rural area; a large city; and two small urban centers.

The Beacons of Excellence project identified three urban middle grades schools that meet the Forum's criteria and others set forth by the project's research team. These schools are Christopher Columbus Middle School in Union City, New Jersey; Compton-Drew Investigative Learning Center Middle School in St. Louis, Missouri; and Manatee Middle School in Naples, Florida. These schools are distinctive in serving low-income, culturally diverse populations. Both the STW and the Beacons schools have worked hard to include students with disabilities in heterogeneous, general education classrooms.

In the remainder of this paper, we provide a brief overview of the strategies that all seven schools have used to achieve the Forum's vision and, in the process, to improve student performance. We have organized them into eight categories that elaborate on the practices identified in Part Three above. The eight categories consist of vision, expectations, curriculum and instruction, accountability, professional development, support for students at risk, family/community involvement, and leadership. This section draws heavily on the work of Nancy Brigham, Joan Lipsitz, Teri West, and Amy Clark, along with the Forum's entire STW Committee. It also encompasses key findings from

the Beacons of Excellence project led by the following researchers: Catherine Morocco, Cindy Aguilar, Nancy Clark-Chiarelli, and Nancy Brigham.

A Shared Vision or Philosophy

All seven schools have a bold vision for the future, typically developed by the principal and then shared with the entire school community. In some cases, such as Barren County Middle School in Kentucky and Freeport Intermediate School in Texas, the vision focuses primarily on state standards. The schools in these states are committed to helping all students in their schools meet the performance standards set for them. In Kentucky, Barren County Middle School also adopted the Different Ways of Knowing educational program, which provides a coherent approach to curriculum and instruction involving the arts. The two Illinois schools are both active members of the AIMS network, which offers a strong vision of middle grades education based on the Turning Points recommendations.

Each of the Beacons schools has a different philosophy based on a different educational theory. One school adheres to the philosophy of Schools for Thought (John Bruer); another has integrated into its own philosophy the principles of the Coalition of Essential Schools (Theodore Sizer); and a third bases its educational program on brain research (Susan Kavalik). Yet, despite their differences, each philosophy provides "a set of shared values, concepts, and directions to guide the school." Furthermore, that philosophy leads to "a coherent set of organizational structures to support equity and excellence, professional development supports for teachers, curriculum and instruction addressing high standards, and school-community relationships that align parents and practitioners around safety and academic excellence" (Morocco, Aguilar, Clark-Chiarelli, and Brigham, 2000).

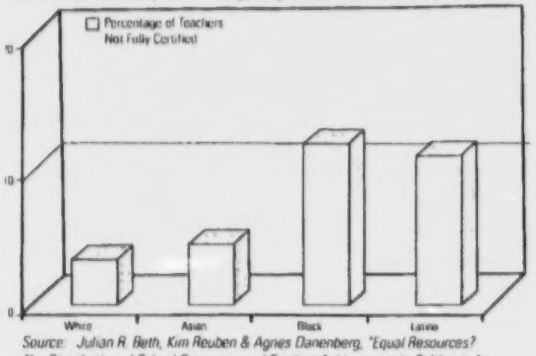
High Expectations for All Students

At high performing middle grades schools, curriculum, instruction, and assessment are aligned with high standards, and all students are expected to meet or exceed those standards. According to the Forum's STW researchers, teachers in the selected schools believe that all their students can master the curriculum, and they push their students to achieve at high levels.

All seven schools provide a coherent vision for what students should know and be able to do. The curriculum is organized and sequenced, so that students' knowledge and skills build systematically over time. In many schools, the curriculum makes important connections across the disciplines. Teachers spend a great deal of personal and common planning time aligning what they teach with professional and state standards within and across their content areas. As a result, when surveyed, nearly

FIGURE 34. Mediocrity by Melanin

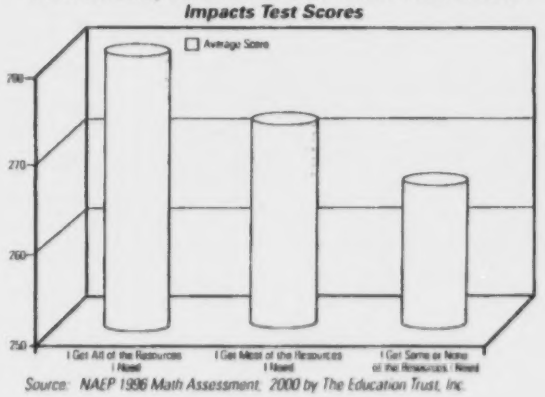
California: African American and Latino Students in 6th - 8th Grade More Likely to be Taught by Less Qualified Teachers 1997



Source: Julian R. Betts, Kim Reuben & Agnes Danenberg, "Equal Resources? The Distribution of School Resources and Student Achievement in California," Public Policy Institute of CA, p. 87. 2000 by The Education Trust, Inc.

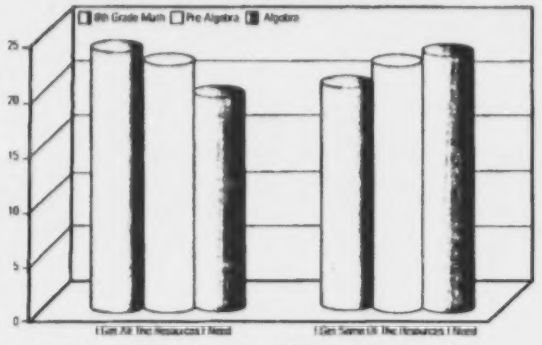
FIGURE 35. Dittos Galore Sink the Average Score

The Availability of Resources in 8th Grade Math Classes Impacts Test Scores


Average Score
280
270
260
250
I Get All of the Resources I Need
I Get Most of the Resources I Need
I Get Some or None of the Resources I Need

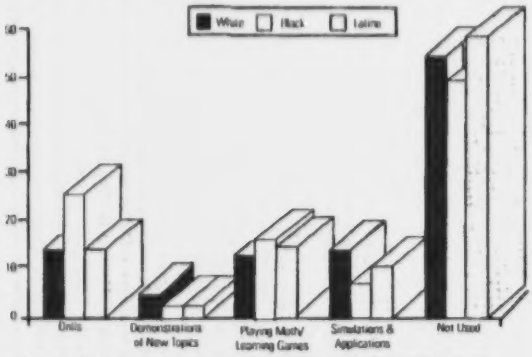
Source: NAEP 1996 Math Assessment. 2000 by The Education Trust, Inc.

FIGURE 36. To Whom the Dollars are Doled: Teacher Reports on the Availability of Resources in Different 8th Grade Math Classes



Source: NAEP 1996 Math Assessment, 2000 by The Education Trust, Inc.

FIGURE 37.
Computers in 8th Grade Math Classes 1996: How are They Being Integrated into Instruction for Students?



Source: NCES Conditions of Education 2000; 2000 by The Education Trust, Inc.

FIGURE 38.
Scores on the North Carolina Reading Assessment: 1992-1998

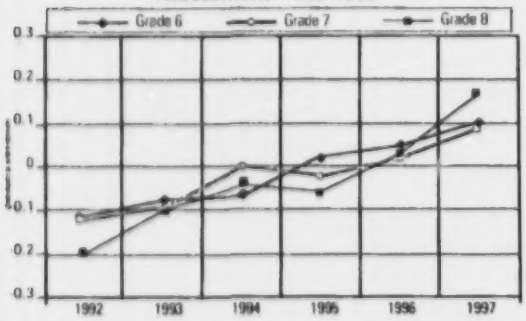
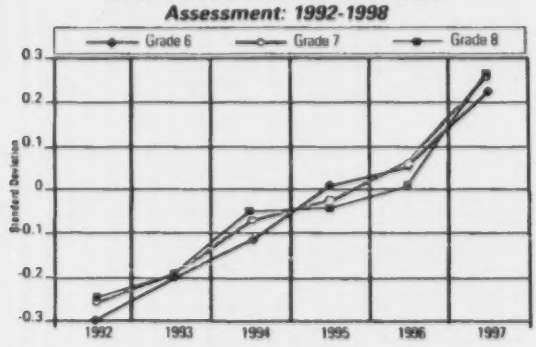


FIGURE 39.
Scores on the North Carolina Math Assessment: 1992-1998



all parents, teachers, and students in the Beacons schools agree with statements like these: "There is a strong sense of academic purpose at this school"; "The curriculum includes important knowledge, concepts, and facts in each curriculum area"; or "There are clear standards for students, which are communicated to students and families."

These teachers perceive standards as a valuable tool in planning their curriculum and instruction, rather than a burden or a distraction from the real work of teaching and learning. One of the Schools to Watch, for example, focuses a great deal of attention on the state accountability system and its high-stakes testing program. Yet, according to the STW researchers, "teachers insist that they are not 'teaching to the test' but rather 'teaching to the standards' when they prepare students for the state test, because the test is based on state and national standards" (Lipsitz and West, 2000).

Challenging and Engaging Curriculum and Instruction

Each of these schools encourages students to think rather than to simply memorize facts. Indeed, one of the Beacons schools is a member of the Schools for Thought (SFT) network. According to Beacons researchers,

> Compton-Drew ILC Middle School is unique in the SFT network in that it is implementing a philosophy of investigative learning across the entire school, and in the related arts (music, art, physical education) as well as the major content areas. In sixth through eighth grade classrooms, teachers, students, staff from the St. Louis Science Center, university researchers, and parents are co-investigators, creating a community of learners. Students develop their own theories and research the big questions they develop as they work to understand critical issues and problems. Learning extends beyond the traditional resources of the classroom, textbook, and library to include investigative resources available throughout St. Louis and in global communities through use of the World Wide Web (Morocco et al, 2000).

All of the schools work hard to ensure that the curriculum is aligned with national and/or state standards. In one School to Watch, for example, teachers work collaboratively to design interdisciplinary units that address a number of different content standards. In another, the mathematics teachers wanted their curriculum to match the state learning goals, which

encourage a balance of skill building and application. After working together to align the curriculum with the state standards, they piloted three textbooks. None of the textbooks fully matched their learning goals, however. In the end, they decided to use a combination of teacher-developed curriculum units, a pre-algebra textbook, and "Connected Math," which offers a range of hands-on activities.

According to the STW researchers, "Teachers in these schools use instructional strategies that include a variety of challenging and engaging activities that are clearly related to the concepts and skills being taught. Students are excited about what they are learning and want to talk about what they are doing. They are able to describe the content and the purpose of the lesson and to reflect on what they are learning" (Lipsitz and West, 2000).

"Each of the Beacons schools has a 'signature practice' that reflects the school's core philosophy and helps to tell the story of what is important in that school," according to the Beacons researchers.

> For example, faculty at Christopher Columbus Middle School value PowerPoint presentations because they provide the large concentration of Spanish-speaking students practice in integrating information and demonstrating their learning to their peers in English. In Manatee Middle School, interdisciplinary teams include a special education teacher, who co-teaches with the content teachers. The Beacons researchers describe the goal of co-teaching as assisting students with learning needs in the regular classroom setting, while modeling effective teaching and learning strategies for the teacher. Finally, in Compton-Drew ILC Middle School, students in all grades and content areas actively engage in "crosstalk." Crosstalk is a highly structured conversational practice in which students hand off the speaker role to one another in order to give everyone a chance to participate in the discussion. Beacons researchers assert that crosstalk encourages deeper thinking by helping students link information, argue different perspectives, and engage in self-assessment (Morocco et al., 2000).

FIGURE 40.
Percent of Texas 8th Graders Passing TAAS Reading: 1994-2000

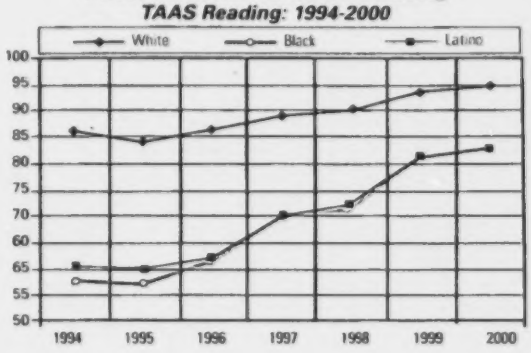
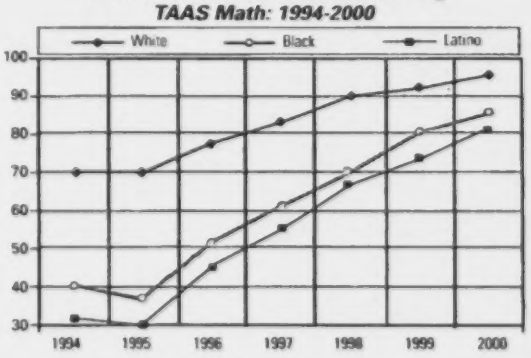


FIGURE 41.
Percent of Texas 8th Graders Passing TAAS Math: 1994-2000



A Focus on Accountability

In high performing middle grades schools, teachers, parents, and students alike are aware of and understand the performance standards. Teachers make their goals and expectations clear, including the criteria by which they will assess students' work. Often, scoring rubrics are posted on the walls, or students will pull them out of their notebooks when asked what is expected of them. Whether students help generate the rubrics or not, the assessment criteria are explicit and make sense to the students. As Lipsitz and West (2000) point out, "The criteria for good work are not a mystery."

According to the STW researchers,

> "These schools also hold themselves accountable for their students' success rather than blaming others for their shortcomings. They collect, analyze, and use school-generated evaluation data to identify areas for more extensive and intensive improvement. They delineate benchmarks and insist upon evidence and results. These schools intentionally and explicitly reconsider their vision and practices when data call them into question. When we asked how they know if they are meeting their behavioral and academic goals, their answers invariably have to do with 'sleuthing their data.' The data the administration and staff collect and analyze serve as the basis for decision-making about areas needing more focused attention and changed practice" (Lipsitz and West, 2000).

For example, STW researchers describe one school's use of an innovative "crate system" to determine whether its school improvement plan is leading to higher student achievement. Periodically, teachers place examples of high, medium, and low student work and accompanying lesson plans into a crate. A curriculum committee meets monthly to evaluate the content of the crates. This information is then summarized in what the school calls a "Vital Signs Report." In addition, at least once every nine weeks, subject area teachers attend meetings facilitated by their "content leader." During these sessions, they evaluate student work and assess student progress. The school-based decision-making council uses this information, along with the "Vital Signs Report," to make decisions leading to continuous school improvement. According to the STW researchers, "The teachers' collection of data not only improves their classroom practice, but also links the school's governance structure to the school's student achievement goals" (Lipsitz and West, 2000).

Intensive and Ongoing Professional Development

The adults in these schools have opportunities to plan, select, and engage in professional development aligned with nationally recognized standards. They have regular opportunities to work with their colleagues to deepen their content knowledge and improve their practice. According to the STW researchers, "When asked what they think professional development is, teachers and administrators invariably say first what it is not." In the words of one STW principal, "It does not come once in the summer and go away. It keeps coming back and back and back."

Teachers in these schools frequently work together to design curriculum units around the statewide academic standards. In Compton-Drew ILC Middle School, for example, all sixth through eighth grade teachers work together with science specialists and university researchers to design 12-week interdisciplinary units. According to the Beacons researchers, "Each unit is structured around a challenging topic, cooperative learning activities through which students rotate, 'consequential tasks' (culminating projects and assessments), and guidelines for assessment that include student self-assessment." Through this ongoing collaboration, teachers not only strengthen their curriculum but also share effective strategies for improving student learning.

Support for Students Who Need Special Help to Meet the Standards

In high performing middle grades schools, all students have equal access to valued knowledge in all school classes and activities. Faculty and administrators expect high-quality work from every student, and they are committed to helping each student produce it. Among the many supports provided are tutoring, mentoring, special adaptations, extended opportunities for learning, use of technology, and health and social services tailored to individual needs.

According to STW researchers, one of the Schools to Watch instituted a program called "Academic Connections" to help students achieve to and beyond the standards. "In this otherwise heterogeneously grouped school, the principal divided students into three groups according to their scores on standardized tests so that they receive instruction specifically geared to their skill levels" (Lipsitz and West, 2000).

In another School to Watch, two after-school programs provide additional instructional time to students who are not meeting academic standards. According to the STW researchers, "The student-teacher ratio in these classes is small — about 12 to 1 — so that teachers can provide more individualized instruction. They meet with one another to determine which students will receive additional tutorial time based on the greatest needs." At another school, the resource room is open to all students for additional tutorials in reading and math. Although some students are assigned to the reading and math resource tutorials, students can also drop in voluntarily.

Christopher Columbus Middle School has a special program for "over-age," at-risk middle school students in which they accelerate their academic learning while also serving in responsible jobs in local hospitals and child care centers. Most of the students in this program enter the tenth grade of their local high school having successfully caught up with their peers after one intensive year in middle school. Student support goes beyond specific services, however. The STW researchers note:

> It begins with a set of attitudes and relationships that adults establish with students. These relationships are evident as visitors walk through the halls and sit in classrooms. Students have smiles on their faces, laugh with their teachers and each other, and exchange friendly salutations. During the change of classes, students are eager to share something about themselves or their families (Lipsitz and West, 2000).

Survey data from the Beacons schools reveal that teachers, parents, and students in these schools find the schools to be safe and caring. Approximately 90 percent of all three groups respond affirmatively to the following statements: "The school is a safe place;" "Teachers and staff at the school care about students;" "Students feel like they belong in this school;" "Teachers and other staff respect me (students)" (Morocco et al, 2000). This "personalization" is as important to students' learning and development as the curriculum that these students receive. Without it, their capacity for learning is severely limited (Ames and Miller, 1994).

Family/Community Involvement

High-performing middle grades schools also develop alliances with families to enhance and support the well being of their children. They involve families as partners in education, keeping them informed, engaging them in their children's learning, and involving them in decision-making. In each of the three Beacons schools, a core of parents is deeply connected with the school. In fact, survey data show that most parents find their schools welcoming, respectful, and accessible. Most parents report that "my child's teachers view me as a partner or team member in educating my child." They also believe that "the school staff understand the problems I face as a parent" (Morocco et al., 2000). Yet all schools, including the seven described here, face a challenge in reaching out beyond a core group, especially where parents are facing economic stress.

Instructional Leadership

All seven principals know how to set clear goals and establish priorities. None has trouble articulating the goals they had when they first came to the school. For example, the STW researchers report the following:

One STW principal had three major goals: to strengthen academics, improve the school climate, and increase parent participation. Over the course of the first year, she met with her staff to turn these goals into manageable objectives for the school improvement plan. She wanted the staff to see the big picture, but also to focus on what was doable. In the second year, she and the staff arrived at specific goals in all three areas, goals that continue to shape the school's improvement efforts (Lipsitz and West, 2000).

These schools do not have multiple programs that are disconnected from one another; the principals work hard to integrate all elements of the school program. Furthermore, in each school, they have helped foster a spirit of collaborative leadership in which administrators, teachers, parents, and students hold themselves collectively accountable for the quality of the educational program and its impact on student performance.

In response to the question, "What are the top three to five things you would do if you moved to another school?" one STW principal answered:

- ★ Communicate a vision for student success very early on. Continually articulate that vision throughout the year, and have a plan for reaching that goal. Staff need to see very early on how high the bar is raised, what the expectations are, and what needs to be done to get there.
- ★ Look at how the school collects data, in which areas, and how those data are used for planning purposes. What guides the initiatives being undertaken at the building level? It is extremely important to collect data, formally and informally, to support the school's goals. There is no other way to be able to accurately assess the strengths and areas in need of improvement without having data for analysis and reflection.
- ★ Look at how each initiative undertaken at the building level is tied into the school improvement plan. It is easy to go off track quickly. Before you know it, there is so much going on in the building that things can quickly become disconnected.
- ★ Continually reaffirm to the staff the great things they are already doing, and give them the latitude and flexibility to try something new and different. We are encouraging staff to be risk-takers, to try new ideas and expand their knowledge and skills. They will be much more likely to do so knowing that the administration already recognizes their contributions and efforts.
- ★ Open your school and its classrooms to external critical friends. We constantly talk about the need for accountability as well as the need for continuous school improvement. What a great way to achieve both by having professionals in the field with specific expertise come in to provide feedback through observation of teaching practices in the classroom and review of our supports for students (Lipsitz and West, 2000).

Conclusion

In general, both national and international assessments of educational progress suggest that middle grade students are not performing well. Low expectations, watered-down curriculum, and inadequately prepared teachers prevent all too many young adolescents from learning to use their minds well. For students from poor families and students of color, the problem is exacerbated. Yet there is some reason for optimism. In certain states, districts, and schools across the country, administrators, staff, and parents are working together to provide young adolescents with the kind of schooling they will need for success in the 21st century. We must learn from these successful middle grades schools, or else we will be limiting the future life and career options of another generation of young people.

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GRAPPLING WITH THE BIG ISSUES IN MIDDLE GRADES LITERACY EDUCATION

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Plenary Address

National Educational Research Policy and Priorities Board's Conference on Curriculum, Instruction, and Assessment in the Middle Grades: Linking Research and Practice

July 24–25, 2000
Washington, DC

This is an exciting time to be in middle grades education. I do not need to tell you of the numerous professional groups and other organizations that are hard at work ensuring that middle grades schools are academically excellent, developmentally responsive, and socially equitable. In fact, many of you in the audience represent these very groups. However, I do want to tell you how I see literacy research and practice fitting into and affecting the larger picture of middle grades education. To do this, I have divided my talk into four parts.

First, I want to share with you my perception of the big issues in middle grades literacy education today. These are the issues I see practitioners, researchers, and policymakers grappling with as they go about their work. Second, I want to put these issues into perspective by summarizing what the research says about them and what it does not say. Third, I want to address the implications of this research for practice, policy, and future inquiry. Finally, I want to direct attention to some questions concerning middle grades literacy education that I believe we should be grappling with next — questions that are too important to overlook if we are truly committed to making a middle grades education socially equitable and accessible to all students.

Big Issues in Middle Grades Literacy Education

For the past three years, I served as co-chair of the International Reading Association's newly appointed Commission on Adolescent Literacy. In that role, I had numerous opportunities to work with middle school educators, researchers, and policymakers from every region of the United States. Our work focused on identifying key issues in the field of adolescent literacy, with a special emphasis on middle grades literacy instruction and assessment. From that work and my involvement in a Reading Task Force recently appointed by the National Council of Teachers of English, I became acutely aware of the issues that people are grappling with in middle grades education.

First and foremost, there is a concern for the young adolescent who struggles with reading. The struggling reader label is a contested term (Alvermann, in press) and one that means different things to different people. For example, a cursory analysis of the table of contents of a recently published book by the International Reading Association on struggling readers (Moore, Alvermann, & Hinchman, 2000) reveals that the term struggling can refer to youth with clinically diagnosed reading disabilities as well as to those who are second language learners, "at-risk," unmotivated, disenchanted, or generally unsuccessful in school literacy tasks. A smorgasbord of descriptors, these labels tell little or nothing about the cultural construction of such readers. They do, however, provide different ways of thinking about school culture and readers who struggle — ways, in fact, that are too seldom addressed in the literature on developmentally responsive instruction.

Another big issue in middle grades literacy education is the perceived need to accelerate students' reading achievement and academic learning in the subject matter areas, such as social studies, science, and the English language arts. In the middle grades, especially, there is interest in developing students' abilities to comprehend and think critically about the subject matter material that they are expected to master as part of the regular curriculum. The rationale behind this perceived need is that comprehension is a complex process — one that should not be left to chance to develop. One of the ways that teachers can ensure the comprehension process is not left to chance is to teach students strategies for reading and studying their assignments. Another way is to preteach the vocabulary associated with those assignments. At issue here is not the effectiveness of such instruction, but rather, the problems encountered when trying to determine which strategies are best suited for which populations of students and why.

A third major issue in middle grades literacy education has to do with finding ways to make use of adolescents' out-of-school interests in computers and the media to foster their in-school subject matter learning. Until recently, the technology for computer-assisted instruction was not conducive to teaching students how to read in the content areas. Computers that were unable to accept free-form responses or to recognize speech were thought to be too limited in their capacity to deliver reading instruction. Much has changed, however. Now, with advanced speech recognition capabilities and the possibilities for integrated multimedia presentations, middle grades educators are turning more and more to computers (and especially the Internet) as a way of engaging students in learning course content. Even so, among many educators in the middle grades, there is a distinct reluctance to trust technology to deliver an appropriate kind of literacy instruction. For some, the computer is an unwelcome intruder in an already too-full curriculum, while for others it is a potential threat to school-sanctioned literacy (O'Brien, 1998; Phelps, 1998).

Finally, an issue that may hold the key to better understanding all the issues I have raised thus far is whether or not the knowledge base in middle grades literacy education is being translated into practice. That is, are teachers implementing the available research on how to teach the second language learner who struggles with reading? Are they teaching the comprehension and vocabulary strategies that are known to be effective in accelerating students' subject matter learning? Do they know how to adapt those strategies so that they are responsive to all students' intellectual and social growth? Do teachers view the research on computer technology and reading instruction as being relevant to their curriculum, and if so, do they incorporate ideas from that research into their own teaching? Answers to questions such as these have implications for researchers and policymakers alike, especially with respect to policy-oriented research on literacy standards and assessment (Valencia & Wixson, 2000).

What the Research Says and Does Not Say

The commissioning of this paper came at an opportune time. The 3rd volume of the Handbook of Reading Research (Kamil, Mosenthal, Pearson, & Barr, 2000) and the Report of the National Reading Panel, an evidence-based assessment of the research literature on reading and its implications for reading instruction (National Institute of Child Health and Human Development, 2000), were both published during the time I was preparing

this talk. The research presented here draws primarily from those two works and from a synthesis of the literature on Reconceptualizing the Literacies in Adolescents' Lives (Alvermann, Hinchman, Moore, Phelps, & Waff, 1998), which was compiled by a group of university- and school-based researchers at the National Reading Research Center a few years earlier. As well, this paper takes into account a synthesis of the research on contexts for literacy in middle grades education (Moore, 1996) and the research on teaching literacy through the communicative and visual arts (Flood, Heath, & Lapp, 1997; Reinking, McKenna, Labbo, & Kieffer, 1998).

Research on Readers Who Struggle

The research on struggling readers covers a broad spectrum and varies in specificity according to the perceived reasons behind the struggle. For example, reviews of research that take into account individuals with clinically diagnosed reading disabilities (Shaywitz et al., 2000) focus on the cognitive basis for the struggle. Reviews that take into account second language reading, on the other hand, encompass a much wider view of the reasons behind the struggle. In fact, the difficulties second language readers experience are often spread over a vast network of sociocultural, motivational, and linguistic factors that vary with the population being studied (Bernhardt, 2000). These factors are also at work (to varying degrees) in the difficulties that monolingual, unsuccessful readers in the middle grades experience when they struggle with their assigned texts.

It is these two latter groups — second language readers and monolingual, unsuccessful readers — that I focus on here. Reviews of research on these two types of readers generally fall into three categories in terms of their approaches to explaining the struggle: the deprivation approach, the difference approach, and the culture-as-disability approach (McDermott & Varenne, 1995).

The deprivation approach. This way of thinking about the struggling reader assumes that there is a stable set of tasks, deemed milestones by a particular culture, to which all its members must respond if they are to qualify as developmentally competent on those tasks. For example, being able to decode, comprehend, and summarize large chunks of informational texts would qualify as one such set of tasks in the middle grades. Students' below-average performances on these tasks are taken as evidence that these students have not yet developed the requisite set of skills necessary for reading competently at a particular grade level or in a particular set of texts.

By far, the bulk of the research on struggling readers in the middle grades is grounded within a deprivation approach to explaining their difficulties. Historically, this research has focused on ways of helping teachers provide support to the slow, "at-risk," unmotivated, or disenchanted reader (Alvermann & Moore, 1991; Bean, 2000; Moore, 1996). Case studies using ethnographic methods have dominated this area of research, largely because they offer opportunities for examining a specific problem in depth and within bounded parameters. These studies have taken place during whole-class instruction (Dillon, 1989), in separate pull-out literacy programs (O'Brien, 1998), and in university reading clinics (Morris, Ervin, & Conrad, 2000).

Regardless of where the research is carried out, the findings are remarkably similar. While the instructional intervention is in progress, students who are struggling with reading show marked improvement in reading performance and their self-esteem also improves. What the research does not tell us is whether these changes are long lasting and transfer to situations beyond the research setting or specific subject mater area under investigation. Studies of a longitudinal and cross-disciplinary nature are sorely lacking in the middle grades literature on literacy instruction.

The difference approach. This approach argues that the ways in which young adolescents develop competencies as literate beings will vary according to the demands of their particular cultures. Thus, middle grades students who struggle with school literacy tasks under the difference approach would likely be subjected to few predefined reading tasks; instead, they would be encouraged to focus on the literacy activities that adults in their culture regularly perform as fully functioning members of that culture. For example, Luis Moll's (Moll & González, 1994) work with working-class Latino/a families provided evidence that teachers can use the "cultural funds of

knowledge" these families possess in making connections between students' home and school literacies. Such connections, in turn, can provide stepping stones for filling in the gaps in students' background knowledge about school-related reading tasks. Although there is some research (e.g., Brozo, Valerio, & Salazar, 2000) to suggest that bilingual middle grades students can benefit from literacy instruction that takes into account their cultural funds of knowledge, much more work needs to be done in this area.

As Garcia (2000) has noted, "the instructional research on older bilingual children's reading is meager" (p. 830). What is available is largely qualitative in nature, such as Jiménez et al.'s (1996) study, which indicated that less successful bilingual middle grades students used fewer cognitive and metacognitive reading strategies than successful monolingual readers. However, there was no difference in the strategies used among successful bilingual and monolingual readers.

The culture-as-disability approach. This approach assumes that all cultures, as historically evolved ways of doing life, teach people about what is worth working for, how to succeed, and who will fall short. To McDermott and Varenne's (1995) way of thinking, "cultures offer a wealth of positions for human beings to inhabit" (p. 336). Each position requires certain things. For example, to inhabit the position of "good reader," one must possess certain abilities that are verifiable and recognizable to others who occupy that same position. But how people end up inhabiting some positions and not others is more a matter of being put into those positions because of differential treatment than of being incidentally born into them, according to McDermott and Varenne.

Using the culture-as-disability approach to understanding struggling readers in the middle grades, one might argue that the school curriculum disables some students by mandating what is assumed to be a stable (though arbitrary) set of reading tasks against which they can be measured, perhaps helped but if not, then pushed aside. Research conducted within a sociocultural framework would tend to support this kind of an argument. For example, Moje's (in press) work shows how gang-connected youth are routinely positioned as resistant learners (and then marginalized) rather than as learners who use alternative literacy practices to express themselves and to make meaning of texts that are essential to their survival. In a review of other research on resistant adolescent readers, Moore (1996) concluded, "reports such as these...are good reminders that a productive research focus might highlight at-risk situational contexts rather than at-risk students" (p. 26).

Research on Accelerating Students' Reading Achievement

Members of the National Reading Panel (NRP) (2000) concluded that seven types of text comprehension instruction met the stringent criteria they had laid out prior to identifying over 450 studies on text comprehension as potential contributors to a solid base of scientific evidence on student achievement. These seven types, which appear below, were found to improve students' comprehension in the context of specific academic areas, such as social studies. They include:

- ★ *Comprehension monitoring*, where readers learn how to be aware of their understanding of the material;
- ★ *Cooperative learning*, where students learn reading strategies together;
- ★ *Use of graphic and semantic organizers* (including story maps), where readers make graphic representations of the material
- ★ *Question answering*, where readers answer questions posed by the teacher and receive immediate feedback;
- ★ *Question generation*, where readers ask themselves questions about various aspects of the story;
- ★ *Story structure*, where students are taught to use the structure of the story as a means of helping them recall story content in order to answer questions about what they have read; and
- ★ *Summarization*, where readers are taught to integrate ideas and generalize from the text information. (The Report of the National Reading Panel, 2000, p. 15)

Although these seven types of comprehension instruction are known to accelerate readers' comprehension generally, they do not tell us anything about the contexts in which such comprehension occurs. Neither do they offer information as to how the various approaches fit within the framework of middle grades developmentally responsive education. Research that could answer these questions is available (e.g., Bean, 2000; Ivey, 1999; Moje & O'Brien, in press; Moore, 1996). This body of research relies on qualitative methodologies to flesh out some of the ways in which content area teachers are using comprehension strategies to create academically excellent, developmentally responsive, and socially equitable literacy instruction in the middle grades. However, studies using qualitative methodologies were excluded from consideration by the National Reading Panel because they did not meet the experimental and quasi-experimental design criteria that the panel specified as evidence of highly rigorous research.

An important aspect of accelerating middle grades students' reading achievement that the National Reading Panel did address was the research on vocabulary instruction. The importance of vocabulary knowledge to subject matter reading has been recognized since the 1920s (Whipple, 1925). In determining the best approach to teaching vocabulary for improved comprehension, the National Reading Panel evaluated 50 studies that met their design criteria. Within those 50, the panel identified 21 different methods. Due to the relatively large number of variables represented in the small number of studies evaluated, the panel could not conduct a formal meta-analysis of the results of these studies. Therefore, the information that I present here represents what the panel called trends across studies.

Basically, the National Reading Panel found that vocabulary instruction does lead to improved comprehension, with computer-assisted instruction edging out traditional methods of instruction in a few studies. Students' vocabulary can also be enhanced incidentally through reading or listening to others read. Preteaching vocabulary found in material that teachers assign students was shown to be effective, as was direct instruction in how to restructure a task and instruction that provided multiple exposures to the same word in various contexts.

Although the panel concluded that much is known about the importance of vocabulary in accelerating reading achievement, they cautioned that the research says little about the best instructional methods or combinations of methods teachers should use in teaching vocabulary. This conclusion adds to the literacy field's growing awareness of the futility in looking for the one best "fix" or combination of "fixes" given the complexities of classroom teaching, especially in these times of increasing diversity and expanding technologies.

Research on the Use of Computers to Foster Subject Matter Learning

The report of the National Reading Panel (2000) indicated that the use of computers for reading instruction is supported. Although members of the panel were hesitant about drawing conclusions from the 21 studies that met their criteria for inclusion in the report, they did make these general statements about the potential for using computer technology in reading instruction.

- ★ The addition of speech to computer-presented text promises to enhance the versatility of that technology in reading instruction.
- ★ The use of hypertext — text that links to supporting information and audiovisuals — may enhance traditional methods of reading instruction.
- ★ The use of word processing technologies may be advantageous, especially given that reading instruction is known to be most effective when integrated with writing instruction.

As the panel went on to note, "striking in its absence is research on the incorporation of Internet applications to reading instruction" (p. 18). Also absent from the research on computer technology, as applied to reading instruction, is the effect of speech recognition devices and the use of multimedia presentations. Although a small number of studies investigating these issues can be found in literature reviews that incorporate studies

using qualitative methodologies (Flood, Heath, & Lapp, 1997; Kamil, Intrator, & Kim, 2000; Leu, 2000; Reinking, McKenna, Labbo, & Kieffer, 1998), by and large the knowledge base on computer technology and literacy instruction is too limited to draw many conclusions at present.

Research on Translating the Knowledge Base into Practice

Given that there is a knowledge base (though uneven in parts) on struggling readers, methods of accelerating students' reading achievement, and the role of computer technology in reading instruction, what is known in the literature that looks at translating research into practice? This question is of considerable concern among the various stakeholders in middle grades education. Yet, based on the most recent reviews of policy-oriented research related to reading instruction (Valencia & Wixson, 2000), the question seems largely unanswerable. Most of the large-scale research projects dealing with implementation have focused on standards-based literacy instruction, large-scale performance assessments, or classroom portfolio assessment, and specifically, portfolio assessment as it is implemented in the early grades. In their review of the policy-oriented implementation research in literacy,Valencia and Wixson (2000) reported only one case study (Loofbourrow, 1994) at the middle grades level. That study, which investigated how two eighth-grade teachers implemented the California Assessment Program in writing, found that the teachers set aside many sound curricular and instructional recommendations in order to attend to the demands of the assessment program.

Thus, research that speaks directly to the concern for how the knowledge base is being translated into practice — a concern that I hear being voiced widely by middle grades educators through my work on the International Reading Association's Commission on Adolescent Literacy — is virtually absent from the literature. This observation is borne out by the report of the National Reading Panel (2000) as well. For example, the members of the panel located only four studies that met their research design criteria on the topic of teachers' implementation of comprehension strategy instruction. Although limited in what they could say based on this small number of studies, the panel released two general statements:

- ★ Teachers require instruction in explaining what they are teaching, modeling their thinking processes, encouraging student inquiry, and keeping students engaged.
- ★ In order for teachers to use strategies effectively, extensive formal instruction in reading comprehension is necessary, preferably beginning as early as preservice. (The Report of the National Reading Panel, 2000, p. 16)

Overall, an emerging theme is one of a growing knowledge base with limited classroom implementation. This situation seems more apparent at the middle grades level than at the primary or elementary levels. The possibility exists, of course, that research is being translated into practice at the middle grades level but that the process itself is not being studied and formally written up for publication.

Implications for Literacy Practice, Policy, and Future Research

The implications I draw here are based on the previous section's report of what the research had to say (or did not say) about the big issues in middle grades literacy education, at least as I perceive them. These implications, while aimed primarily at literacy practice, policy, and future research, also address academic excellence, developmentally responsive instruction, and socially equitable classrooms — the three mainstays of high performing middle grades schools (National Forum to Accelerate Middle Grades Reform, available at http://www.mgforum.org).

Implications for Literacy Practice

As with all reports, that of the National Reading Panel must be read with a clear understanding as to the limitations of its findings. For example, the panel did not address issues relevant to second language readers. This

leaves a gaping hole in the research literature necessary for making instructional decisions about teaching reading to an ever-increasing number of second language learners in this country's middle schools.

Nor did the panel consider any research that fell outside the experimental and quasi-experimental designs of quantitative research. Thus, a large body of potentially rich contextual information was overlooked. The absence of context means that as potential consumers of the report we have no real sense of the teachers' beliefs and understandings that drove the literacy instruction, which the panel in turn studied. Because of this limitation, precaution needs to be taken in drawing implications of the National Reading Panel's findings on text comprehension instruction for classroom practice.

For example, six of the seven approaches that the panel concluded had a solid research backing are representative of the methods teachers would use if they believe reading comprehension instruction consists of teaching strategies that enable individual students to work by themselves in extracting information from printed texts. As Wade and Moje (2000) pointed out elsewhere, this rather narrow view of the reading comprehension process risks "disenfranchising large groups of students for whom print texts are not paramount because they hold different social or cultural values" (p. 623). Wade and Moje went on to argue that this view of the comprehension process also "privileges the learning and textual practices of some students and devalues the practices of others" (p. 623). Thus, caution needs to be taken so that in interpreting the results of the panel's findings about effective types of comprehension instruction, one is fully aware of the assumptions behind some of the approaches to teaching middle grades students — assumptions that could conceivably undermine opportunities for creating socially equitable classrooms.

Implications for Policymakers

Currently, issues of excellence rank high on policymakers' agendas in the United States. This observation impelled Au (2000) to write, "The danger is that challenging standards, like standardized tests, will not have a positive effect on the achievement of students of diverse backgrounds, but will simply serve as another means of identifying students of diverse backgrounds as losers in the educational game" (p. 845). The possibility of this scenario playing itself out seems to be an implication of the research on struggling readers, especially if policymakers fail to take into account how culture — the very culture of which they are a part — constructs readers who struggle (McDermott & Varenne, 1995). This construction occurs in various ways. For example, as Au (2000) has pointed out, "when the reference point for proficiency is determined by comparing [the scores on a standardized test of] one group to a second group...students of diverse backgrounds will always be placed at a disadvantage because of the assumption that the distribution of scores must follow the normal curve" (p. 845). Or, when an adolescent's multiple literacies are ignored in favor of looking only at his or her performance on conventional school reading tasks, policymakers may not get a clear picture of that individual's capabilities. In these ways and others too numerous to mention here, policymakers may position some students as struggling readers, who, as Au reminds us, ultimately become the losers in the education game.

Another implication from the research on struggling readers is that policymakers at the school and district level could easily infer from the literacy studies conducted within a "difference" approach that alternative curriculums and developmentally appropriate instruction are virtually risk free. One scenario that might follow from such an inference would be this: a school offers literacy instruction grounded in a curriculum that respects individual differences and feels relatively assured that students from diverse backgrounds will succeed. However, this would be much too simplistic a view. For as McDermott and Varenne (1995) have pointed out, "despite a liberal lament that variation is wonderful, those who cannot show the right skills at the right time in the right format are considered out of the race for the rewards of the larger culture" (p. 335). In effect, the school in question could very well be constructing losers in the education game that Au (2000) described earlier.

Implications for Future Research

Researchers working within both the quantitative and qualitative paradigms have much work to do if they are to address adequately the issues that literacy educators in the middle grades are grappling with on a daily basis. Although large numbers of studies exist on how to teach reading comprehension, only a few select topics within this domain have been included in the type of rigorous meta-analyses that the National Reading Panel (2000) recently conducted. Among those topics that the panel did address, questions still remain as to the applicability of certain findings for middle grades education. Partial or provisional answers to some of those questions, however, might be forthcoming if the findings from qualitative research on reading comprehension instruction were to be analyzed in a way that made them available (and interpretable) through cross-case comparisons. Subsequently, new experimental or quasi-experimental research might be designed to address hypotheses that arise from more in-depth and close-up qualitative work.

Other issues pertinent to middle grades literacy instruction that have been virtually ignored by researchers in the past include those which involve computer technology and the media. Attempts at merging young adolescents' out-of-school interests in computers and the popular media with in-school subject matter learning have been documented informally in a variety of contexts across the United States (Alvermann, Moon, & Hagood, 1999; Chandler, 2000; Lewis, 1998; Reinking, McKenna, Labbo, & Kieffer, 1998) and elsewhere (Buckingham & Sefton-Green, 1994; Knobel, 1999; Luke, 1997; Neilsen, 1998; Semali & Pailliotet, 1999). However, until researchers begin to explore more such attempts in a systematic way over a long period of time, it is doubtful that middle grades educators will have the information they need to make informed decisions about the wisdom of blurring the boundaries between in-school and out-of-school literacies.

Finally, questions concerning the degree to which the knowledge base in middle grades literacy education is being translated into practice remain largely unanswered. Studies are needed that both quantitatively and qualitatively investigate what characterizes a school in which teachers, administrators, and supervisory personnel actively engage in applying relevant findings from the available knowledge base to their school's curriculum, and, in particular, to teaching reading in the content areas. A major focus of any such inquiry should be on how well, if at all, the research on bilingual students' reading development and instructional needs is being implemented schoolwide. Concurrently, additional quantitative and qualitative research should be designed that would augment the rather meager (Garcia, 2000) body of literature presently available on second language reading instruction.

Questions that Need Grappling with Next

Literacy is on the verge of reinventing itself. Allan Luke and John Elkins, editors of the *Journal of Adolescent & Adult Literacy*, noted in their first issue of the journal (Luke & Elkins, 1998) that the potential for such reinvention is reflected in the way "texts and literate practices of everyday life are changing at an unprecedented and disorienting pace" (p. 4). Attributing these changes largely to new information technologies and to the complex multiliteracies these technologies entail (New London Group, 1997), Luke and Elkins characterized the era in which we are living as New Times. It is a time of major shifts in cultural practices, economic systems, and social institutions on a global scale — a time when literacy educators from around the world are speculating about ways in which new technologies will alter people's conceptions of reading and writing. As Elkins and Luke went on to point out, "adolescent literacy in New Times will require an engagement with "critical literacies"...[and] new kinds of reading specialists" (p. 213) rather than simply more of the same programs that are already in place in today's middle and secondary schools.

I want to suggest that in thinking about the wherewithal for meeting this requirement in middle grades education, we begin with the question, *What counts as reading when reading really counts?* Exploring the assumptions that support asking such a question in the first place could conceivably lead to productive inquiry into the multiple literacies of middle grades students and away from some idealized generalization about what "real"

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reading is (and is not). It is conceivable that such explorations might also lead to an increased appreciation for the breadth of reading and writing practices in which struggling readers engage on a daily basis.

Currently, with the greatest proportion of the professional literature on middle grades literacy education reflecting an autonomous model of reading and writing (Street, 1995), the assumption is that *literacy* is singular in form and spelled with a big L. The tendency to assume that this model is also "natural" (and thus free of any ideological positioning) is supportive, in turn, of our tendency as a profession to reify written language. I want to argue that the understandings to be gained from a dialogue on *what counts as reading when reading really counts would go far in addressing this assumption.*

A second question I would like to see addressed is this: *What is our response going to be to the literacy challenges that adolescents face in New Times?* Now, perhaps more than ever before in the history of middle grades literacy education, the demands of new technologies and the complexities of living in a highly globalized society are seriously taxing our capacities as a profession to respond to adolescents' needs in ways that will enable them to become fully functioning citizens of the 21st century. Part of the reason we may feel caught off guard is that for years now the focus of attention has been on reading instruction at the primary and elementary levels.

Years of neglect in addressing the literacy needs of older readers have exacted their toll. Although close to 75% of U.S. adolescents can read and write at the most minimal or basic level, fewer than 5% are capable of performing at the advanced level (National Assessment of Educational Progress, 1999). The polarization of these two literacies--basic and advanced--reflects more than just reading proficiency level, however. It can also establish the basis of an individual's perceived worth, which in turn can translate into economic and social advantages or disadvantages, as the case may be (Lankshear, 1998). And, while I have serious reservations about the narrow perspective on literacy that the National Assessment of Educational Progress (NAEP) measures, at the same time it is the case that NAEP reading assessment data are used to make important policy decisions that will ultimately affect adolescents' economic and social lives for years to come. For this reason and others that are articulated at length in the literature on critical literacy (Gee, 2000; Moje, Young, Readence, & Moore, 2000; Siegel and Fernandez, 2000), I think it is time for us in middle grades education to ask a third question: *What is the danger in continuing to view literacy as a set of "neutral" psychological skills that are easily, if narrowly, measured rather than as a complex mixture of social and political practices through which to work toward equality and social justice for all?*

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MATHEMATICS IN THE MIDDLE GRADES: LINKING RESEARCH AND PRACTICE

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Plenary Address

National Educational Research Policy and Priorities Board's Conference on Curriculum, Instruction, and Assessment in the Middle Grades: Linking Research and Practice

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> Middle-grade students are unique. No other grade span encompasses such a wide range of intellectual, physical, psychological, and social development, and educators must be sensitive to the entire spectrum of these young people's capabilities. For many students the middle school represents the last chance to develop a sense of academic purpose and personal commitment to educational goals. Those who fail at the middle grade level often drop out of school and may never again have the opportunity to develop to their fullest potential. (Honig, 1987, p. v)

During their years in the middle school, many students become turned off to mathematics. Such students are less likely to take mathematics courses for the college bound, and thus their futures are deeply affected. I won't speculate here on the many reasons this turning away happens, but, rather, I will discuss some of what we know about mathematics in the middle school that affects the learning process.

I begin with some comments about what research can and cannot offer us when we consider issues related to middle school mathematics. I intend for these comments to serve as a backdrop for the remainder of this presentation.

Several years ago I attended a session at a National Council of Teachers of Mathematics (NCTM) conference during which the then new California Assessment Program was being discussed. John Saxon, who published mathematics textbooks, objected to the assessment items. I was at first surprised, because to me the items measured the mathematics I thought students should be learning in the middle school. I countered by asking Mr. Saxon whether the items were inappropriate in his opinion because he did not value the type of knowledge being assessed. This event triggered for me an understanding of the major role that values play in our decision-making about what mathematics education should look like in today's schools.

What do I mean by values? Values function as the "criteria people use to select and justify actions and to evaluate people and events" (Schwartz, 1992). I strongly believe that the "math wars" now being played out in California and in some other states are wars of values. Values, like beliefs, are firmly held and sometimes jealously guarded, and when they conflict, wars on some scale seem inevitable unless we stand back and examine our values and their origins and try to understand the values of the opposition and the origins of their values. The new NCTM *Principles and Standards of School Mathematics*, recently published, represents a particular set of values with regard to school mathematics, values different from those of, for example, the group calling themselves Mathematically Correct. As Jim Hiebert (1999) has said,

> Standards in mathematics education, like those in other fields, are statements about priorities and goals. In education, they are value judgments about what our students should know and be able to do. They are chosen through a complex process that is fed by societal expectations, past practice, research information, and visions of the professionals in the field. The process is similar to the one that operates in selecting standards in other professional fields. Research can influence the nature of the standards that are adopted, but, in the end, research is not the sole basis for selection of the standards. Standards, ultimately, are statements about what is most valued (p. 4).

I next turn to consideration of some important issues relating to curriculum and instruction in mathematics, keeping in mind what has just been said about the role of values.

Mathematics Curriculum in the Middle School

I have recently given considerable thought to curriculum issues, but from the standpoint of what teachers need to know to about mathematics in the middle school, which in my mind is closely related to what students need to know. I think you will find a considerable amount of agreement in three recent documents delineating what should be taught in the middle school: NCTM's *Principles and Standards for School Mathematics* (2000), the benchmarks used to evaluate textbooks by the American Association for the Advancement of Science (2000), and in a document under preparation by the Conference Board of Mathematical Sciences. In this last document, the professional preparation of teachers and a challenging mathematics curriculum are coupled.

Let us consider just a few topics from middle school mathematics. One topic is number and number relations. I do not believe that most people realize the enormous changes that take place in the study of number as children move from primary grades into the middle grades. Students move from operating on whole numbers to operating on signed numbers and rational numbers (that is, fractions and decimal numbers) and from a primary focus on addition and subtraction to multiplication and division as well. Hiebert and Behr (1988), writing about the changes that take place when students move into the middle grades, said that "Underneath all of the surface level changes is a fundamental change with far-reaching ramifications: a change in the nature of the unit." Here are three examples of this change.

- ★ Students move from singleton units to composite units when they multiply; that is, what counts as a number changes: A set of things can now be thought of as one whole; I have two sets of three pencils; I have four six-packs of Coke.
- ★ Students create new types of unit quantities when they divide: Dividing 30 cookies by 6 children yields 5 "cookies per child."
- ★ Units are partitioned to form fractions. A number, for example 1/3, is now part of a whole but can be thought of as a unit itself, so that it makes sense to talk about multiples of one-third, for example, "two one-thirds is two-thirds."

When teachers do not understand the significance of these subtle changes in how numbers are used, their students can become very confused. Thompson (1995) used the following problem in a research study with teachers to help them understand the importance of always understanding what the unit is.

What do you see here? Most of you will say 3/5, which is correct if you refer to the large rectangle as your unit and consider the shaded area as 3/5 of that unit. Can you see 2/5? Yes, if you look at the unshaded area and use the large rectangle as your unit. But now, can you see 5/3? Yes, if the shaded part is your unit, then the entire large rectangle is 5/3 of that unit. Can you see 2/3? Yes, if ___ is the unit, then ___ is 2/3 of the unit. And so on. The ability to flexibly change the referent unit is important in understanding, for example, multiplication of fractions. If I have 3/4 of a pint of ice cream, and I give my husband 2/3 of it and keep the rest, how much ice cream does he get? The pint is the referent unit for the 3/4, but the 2/3 is referring only to the 3/4 pint, not to the whole pint. And the answer, 2/4 (or 1/2), refers again to the whole pint. To summarize, research shows that the difficulties associated with the transition from the study of number in the early grades to the study of number in the middle grades has been vastly underestimated.

Another of the major areas of change in the middle school is the extended reasoning power required of students as they move through these grades. For example, consider this vignette from a fifth-grade class taught by Shey (abbreviated from Sowder, Philipp, Armstrong, & Schappelle, 1998, p. 100-101).

> *Shey*: Nicole's a banker, and I'm going to invest money with her. I give Nicole $2. At the end of the year, Nicole is going to give me back $8. Phil doesn't like to part with his money, but Nicole talks him into a good deal. Phil's going to give Nicole $6, and at the end of the year Nicole is going to give him $12 back. Who do you think would get the better deal out of this? Or would we both get the same [deal]?
>
> After a brief discussion, the students overwhelmingly voted that the two were the same. Shey then revised the problem:
>
> *Shey*: Okay, here we go again. I will invest $1. I'm going to invest $1 with Nicole. Nicole is going to give me $20 back. Phil is going to invest $60. And he's going to get $79 back. I invest $1 and I get $20. Phil gives her 60 bucks and he ends up with 79 bucks. Who makes the most money? Phil, who makes the most money? [He wrote numbers on overhead projector.]
>
> The students struggled with this question until one student began to look at the problem differently:
>
> *Henry*: I'd put a dollar [in Nicole's bank] because if I put a dollar in there, I'd get 19 back; if I keep on putting more dollars in there, it'll go past 79.

Henry was beginning to understand that there is more than one way to compare. In the first problem children were comparing *additively* — that is, they were finding differences, and using the differences for purposes of comparison — the difference in each case was $6. Using Henry's response, the teacher could begin to teach students to compare *multiplicatively* — that is, to compare ratios: The ratio of 20 to 1 is much larger than the ratio of 79 to 60. Almost all situations dealing with growth comparisons require multiplicative reasoning. The ability to reason multiplicatively is basic to proportional reasoning.

There is a great deal of research showing that coming to reason proportionally and understanding when proportions are appropriate is another of the major mathematical hurdles of the middle school (e.g., Harel & Confrey, 1994). Yet, in many textbooks, this topic is covered in a cursory manner. One sixth-grade teacher asked me, "How can my sixth-grade students begin to reason proportionally if the textbook covers this in just two lessons?" Students are taught how to set up an equation, $a/b = c/d$, with one of the variables unknown, then to cross-multiply and solve the resulting equation for the unknown. This is a process; carrying it out does not necessarily lead to proportional reasoning.

Consider another, more recent middle school mathematics topic: algebra. Algebra is a natural extension of arithmetic; it can be thought of as generalized arithmetic. It provides a symbolic language that can be used to represent and analyze quantitative relationships. Many school districts now require that all students take algebra in eighth grade. But there is no research showing that this is when students should learn algebra. Rather, if formal algebra is generalized arithmetic, then students must understand arithmetic before they can make any sense of algebra. Why has this issue become a lightning rod in curriculum debates? Probably because algebra is seen as the gateway to further mathematics and to college, and denying it to some students is a serious inequity. I can agree with that reasoning, but that still does not tell me why algebra *must* be offered in eighth grade. If students are ready to learn algebra in eighth grade (or even earlier), they should be given the opportunity to do so, but if they are not ready, they are being set up for failure. I argue that the matter of what type of algebra should be taught and learned, and when it should be taught, have become value-laden issues. In fact, the NCTM *Dialogues*[5] issue for April 2000 was devoted to providing a space for many views of the "what and when" of algebra. Algebra is integrated into the curriculum in most countries. Research does not tell us when students should learn algebra; the placement of algebra should be an issue of readiness, but instead it has, in many places, become an issue of values.

I've talked a bit about three particular curriculum areas — number and number relations, multiplicative reasoning, and algebra. What about the curriculum as a whole? How do (or how should) schools decide on curriculum and textbook adoption? Is there research to guide them? Actually, yes. Two very good curriculum-comparison studies have been published recently, both focusing on secondary mathematics, but I believe the messages can be carried down to the middle school. In the first, Boaler (1998) spent three years gathering case-study data in two secondary English schools with very different approaches to teaching mathematics. Both qualitative and quantitative data were collected. This study was possible because of some experimentation in the British National Examinations. Schools were allowed the choice of taking a problem-solving oriented examination, and so one school decided to experiment with a problem-centered curriculum. The other school used a very traditional approach to mathematics. What students learned was quite different in the two schools. In Boaler's words,

> Students who followed a traditional approach developed a procedural knowledge that was of limited use to them in unfamiliar situations. Students who learned mathematics in an open, project-based environment developed a conceptual understanding that provided them with advantages in a range of assessments and situations (p. 41).

In a second study (Huntley et al., 2000a), Core-Plus (a secondary curriculum based on the NCTM Standards) was compared with a "traditional" curriculum. Six sites out of 36 schools were selected, using stringent criteria, for the study. Each school had two teachers teaching the new program and one, two, or three control teachers. At 5 of the 6 sites, students were either randomly assigned or matched on ability. Three assessments were administered; one emphasized contextualized problem-solving, one focused on context-free symbolic manipulations, and a third required collaborative work on open-ended problems. Not surprisingly, the Core-Plus students had significantly higher scores on the first and third assessments; the control groups had significantly higher scores on the second assessment. The authors concluded that "the question facing those responsible for planning school mathematics curricula is what mathematics is most important for students to learn" (Huntley et al., 2000b). Once again, the question is one of values.

Both curriculum-comparison studies were long term and difficult to carry out. Both studies represent about as much control as a researcher can have in school settings. Establishing cooperation from schools and parents for such studies is not a trivial matter. Randomly assigning students to classes is rarely permissible, designing fair assessments is very difficult, and determining implementation of the curricula is problematic. It is no wonder that there are so few studies comparing curricula. As an editor of a research journal, I have had to reject several curriculum-comparison studies because of these methodological problems. I have argued many times that all these studies really show is that what is learned depends greatly on the curriculum selected and that whether or not students are learning the "right things" from a particular curriculum is a matter of what is valued. To judge any curriculum we must first specify what knowledge we want students to acquire, and for what reasons, and then we must determine how to assess for that knowledge.

Many opponents of "reform-oriented" curricula argue that these curricula teach "fuzzy math." Is this a fair accusation? It depends on what one means by *fuzzy*. Certainly many of the problems we encounter in real life are fuzzy, and we must have the skills to clarify a problem before it can be solved. Is the skill of being able to carry out this clarification more or less valuable than having the skills to carry out procedures divorced from their context? The opponents use this term, however, to indicate that students are not learning the mathematics they need to learn. Yet I consider much of the learning that occurs in the traditional curriculum to be fuzzy. For example, in a research project at San Diego State, we recently interviewed a fifth grader, considered to be a fairly good student, from a traditional mathematics program in which a unit on fractions had been taught. She was asked to compare fractions by circling the larger of two fractions and to explain her reasoning. Here are some of her responses.

> 3/6 and 1/2: Response: "I chose 1/2, because if you change the denominator to one; it's one digit lower, and one is a whole number."
>
> 1/7 and 2/7: Response: "I chose 1/7 because I thought it was just the smallest number, and usually you go down to the smallest number to get to the biggest."
>
> 3/10 and 1/2: Response: "I chose 1/2 because I could just change the bottom number one more digit and it would be one."

There is some consistency to the responses. This student seemed to remember something about reducing fractions, and was attempting to apply this procedure to compare fractions. But the responses are too fuzzy to tell what she was really thinking.

Here is another example in which the reasons for the fuzzy thinking are more evident. In a research study I undertook a few years back (Threadgill-Sowder, 1984), 29 middle school students from several schools, in interview settings, were asked to estimate answers for several computation problems. On one problem they were asked to tell approximately what the answer would be for 0.52 x 789. Only 6 of the 29 students rounded 0.52 to 1/2 or 0.5 or 50%. Most of the students rounded 0.52 to 1 (using a rounding rule they had learned), then rounded 789 to 800, and said that the answer would be about 800.

I have one last example for you. In a NAEP test (1983), only 17% of 13-year-olds could answer the NAEP item "George has 3/4 of a pie. He ate 3/5 of that. How much pie did he eat?" Yet, 60% could correctly calculate 7/8 x 3/2. More than half the students could multiply fractions, but they could not recognize *when* fractions should be multiplied! I could provide many more such examples of the fuzzy thinking that occurs when students blindly learn procedures without making sense of them.

Instruction and the Classroom Environment

There is much that could be discussed in this section, but I will limit my remarks to consider research studies in three quite different aspects of instruction: problem solving, motivation, and tracking by ability.

Problem Solving

I will begin by describing a study of the ways in which children solve word problems (Sowder, 1988). More than 70 middle school children, most in Grades 6 and 8, were given story problems to solve. An interviewer observed each student's work and later questioned the student about his or her thinking while solving the problems. Most of these students were considered by their teachers to be of average or above average ability in mathematics. The types of student thinking were categorized into seven strategies.

- ★ ***Coping Strategy 1.*** Find the numbers and add (or do whatever computation has been most recently studied).
- ★ ***Coping Strategy 2.*** Guess at the operation to be used.

These two coping strategies were used by students who simply had no idea what to do but felt compelled to provide an answer.

- ★ ***Limited Strategy 3.*** Look at the numbers; they will "tell" you which operation to use. "If it's like, 78 and maybe 54, then I'd probably either add or multiply. But [78 and] 3, it looks like a division because of the size of the numbers."
- ★ ***Limited Strategy 4.*** Try all the operations and choose the most reasonable answer. (I saw this strategy used by a seventh-grade student in the gifted program. She could work any one-step word problem using this strategy and obtain the correct answer. But when the problem involved more than one step there were too many possible choices and she was unable to find an answer.)
- ★ ***Limited Strategy 5.*** Look for "key" words to tell which operation to use. Emmy (Grade 8) said, "Certain words like of is equal [sic], and is is to multiply, or something like that. Certain words like that tell you what to do."
- ★ ***Limited Strategy 6.*** Decide whether the answer should be larger or smaller than the given numbers. If larger, try both addition and multiplication and choose the more reasonable answer. If smaller, try subtraction or division. In one interview, the student was asked "Why division?" Fred (Grade 8) responded "Because it's reducing something. And I know that when you reduce something you're either taking it away or dividing it."
- ★ ***Desired Strategy 7.*** Choose the operation with the meaning that fits the story. Very few students used this strategy, which requires that one understand the appropriate arithmetical computation needed to solve the problem. Even when students use this strategy, they sometimes lack confidence in what they are doing.

  Student: I just pictured the post, how deep the water was... Sometimes I picture the objects in my mind that I'm working with, if it's a hard problem...

  Interviewer: Does that help?

  Student: Yeah, it helps. That's just one way of, kind of, cheating (!), I guess you'd say.

(As an aside, I find that many prospective teachers consider drawing a diagram to try to figure out what is going on in a problem "childish" and reflective of less understanding than giving an algebraic solution. Where does this misconception arise?)

It is no wonder that students are unable to solve story problems requiring more than one step, or that they cannot solve algebra problems in which there are not enough numbers to "tinker with." Yet text materials rarely help teachers teach well the meanings of arithmetic operations and when each operation should be used. I know

from my work with teachers that many of them do not know when a particular operation should be used and that some continue to teach the "key word" approach even though it can be very misleading. *We must recognize that the ability to perform computational operations is not sufficient; students must know when to use particular operations. Why should a student be expected to carry out paper-and-pencil long division but not be expected to know when to divide or what the results mean?*

But problem solving means far more than solving story problems if we value the ability to solve challenging problems, problems that contain some ambiguity and that will probably elicit some frustration and anxiety before a solution is reached but which when solved can be the source of considerable pride and a feeling of mathematical power. Consider next an investigation (Henningsen & Stein, 1997) of the role of the teacher in turning good mathematical tasks into learning experiences that require problem solving by the students. Recognizing that mathematical tasks are "vehicles for building student capacity for mathematical thinking and reasoning," (p. 530) the researchers analyzed 144 high level mathematical tasks used by teachers during reform-oriented instruction. They considered (a) the task features (e.g., the number of solution strategies, number and kind of representations, and communication requirements) and (b) the cognitive demands (e.g., memorization, the use of procedures connections to concepts, the "doing of mathematics"). The gathering of classroom data and the coding of tasks were detailed and carefully undertaken. The researchers found that when tasks were undertaken in the classroom, the cognitive demands of the tasks tended to decline due to several factors. For example, the problematic aspects of the task became routinized, either because students pressed the teacher to reduce task ambiguity and complexity or because teachers took over the challenging aspects of the task and performed them for the students. Task quality declined also if the teacher shifted the focus from doing the task to the solution process and the correctness of the answer (usually because of too little time). Thus, very good tasks (or curricula) can get "dumbed down" and may not be implemented in the manner intended.

In another study (Stein, Grover, & Henningsen, 1996), the investigators found that when tasks "work" and when students' engagement remains at a high level, a large number of support factors were present:

- The task built on students' prior knowledge.
- Scaffolding took place.
- An appropriate amount of time was devoted to a task.
- High-level performance was modeled.
- The teacher sustained pressure for explanation and meaning.
- Students monitored their own progress.

Other times a task does not "take hold" for one or more reasons:

- There was a decline into using procedures without connections to concepts, to meaning, or to understanding.
- There was a decline into unsystematic exploration.
- There was a decline into no mathematical activity.

Teaching in ways that encourage and promote problem solving can be very difficult. But problem solving is the very heart of mathematics — we cannot ignore it. Rather, we need to find ways to help teachers become better at sustaining student work on challenging tasks, and we need to help teachers and parents see its value.

Motivation

The teacher is responsible for motivating her students. What does research have to tell us about motivation? In a recent review of this topic (Middleton & Spanias, 1999; 2000) as it pertains to mathematics learning, the literature was summarized in terms of five statements based on solid, verifiable evidence on what influences motivation:

1. *Motivations are learned.* Although students in the early grades like mathematics, middle school students begin to perceive mathematics as a special subject area in which only students with special ability succeed; the rest, who merely get by or fail, tend to avoid mathematics because it is no longer a part of their academic self-concept.
2. *Motivation hinges on students' interpretations of their successes and failures.* All else being equal, it is the expectation of success, mediated by the value placed on a task, that influences the effort one is willing to expend. One estimate given is that a person needs to be successful about 70% of the time to continue engagement in a task; that is, the task must not be too easy, but it must be sufficiently challenging for the student to feel she can succeed (Dickinson & Butt, 1989).
3. *Intrinsic motivation is better than engagement for a reward.* Research has shown that students are less likely to engage in a task that is simply a means to an end such as a treat or avoidance of a sanction than when a task is enjoyed and valued, and provides a possibility of success.
4. *Inequities are influenced by how different groups are taught to view mathematics.* The motivational research has stimulated change on equity issues in mathematics education. Women and minorities in general have been less likely to take the advanced mathematics that leads to higher paying occupations.
5. *Teachers matter.* Students in inquiry-oriented classrooms are less likely to conform to doing mathematics the same way as the teacher, or to believe that doing so leads to success. For these students, success is more likely to be defined making sense of mathematics. These students are more likely to work cooperatively and to be able to explain mathematics to one another. Student performance is likely to increase in these classrooms, particularly performance on conceptual and nonroutine tasks.

In another investigation of motivation (Stipek et al., 1998), the researchers reviewed both the literature on reforming mathematics instruction and the literature on motivation in general. Interestingly, they found that many of the same themes ran through both bodies of literature:

Teachers engaged in reform-minded mathematics instruction are counseled to increase students'

(a) focus on learning and understanding mathematical concepts as well as on getting right answers;

(b) self-confidence as mathematics learners;

(c) willingness to take risks and approach challenging tasks;

(d) enjoyment in engaging in mathematics activities; and

(e) related positive feelings about mathematics. All these motivation objectives for students seen in the mathematics reform literature figure prominently in the achievement motivation literature as well (p. 466).

Tracking or Untracking?

Many educators believe that both high-ability and low-ability students in mathematics classes are better served when they are grouped by ability level and instruction is differentiated for the ability groups. The question of tracking, or untracking, is a pesky one and more often than not answered in ways that tend to be self-serving. The study I present next has addressed this question, with interesting results. The researchers (Linchevski & Kutscher,

1998) had the good fortune to be approached by a school in which the teachers were dissatisfied with what their low-ability students were learning. The teachers, administrators, and parents agreed to participate in a study of the effects of ability grouping. When the students entered Grade 7, they were randomly assigned to one of four groups. On the basis of their placement tests two of the groups were then divided into three classes, a high-ability group, an intermediate-ability group, and a low-ability group. The other two groups were also tested, and the researchers *hypothetically* assigned them to ability groups on the basis of their test scores, but these students were left in their heterogeneous, mixed-ability classes. The teachers of the mixed-ability classes were not told of the hypothetical grouping done by the researchers. Five teachers were randomly assigned to the five classes, the three ability groups and the two mixed-ability groups. These classes stayed together for two years. At the end of Grade 8, students in all five classes were tested twice. One test was given to all students. Three tests were designed to be administered to the three ability groups, so that each student grouped by ability took the appropriate test. But, students in the mixed-ability classes were also tested using the ability group tests; they were given the test developed for the ability group to which they had been hypothetically assigned at the beginning of seventh grade, that is, they were given the same test they would have received had they been grouped by ability.

The average scores of high-ability students were not affected by the ability grouping. A study of performance on test items showed that high-ability students from the mixed-ability classes lost some points on formal presentation and notation, as would be expected, but overall they understood the content as well as the students in the high ability group. *The average scores of the intermediate- and low-ability students showed major effects of grouping: Students in mixed ability groups, who, at the beginning of grade 7 tested as middle and low ability students, scored much higher than their peers of comparable ability placed in middle- and low-ability classes.* In fact, some low-ability students from the ability-grouped class turned in empty papers on the common test, whereas the equivalent students in the mixed-ability classes scored an average 54%. Apparently students in the mixed-ability classes were accustomed to much higher demands and expectations. Fifty-four percent may not seem like a good score, but it is certainly better than a score of zero.

Implications for Linking Research to Practice

In a 1997 *Educational Researcher* article, Kennedy explored the connections between research and practice in terms of what she considered to be the "apparent failure" of research to influence teaching. She hypothesized four reasons for the disjuncture between research and practice.

1. The research itself is not sufficiently persuasive or authoritative.
2. The research has not been relevant to practice. It has not been sufficiently practical, it has not addressed teachers' questions, nor has it adequately acknowledged their constraints.
3. Ideas from research have not been accessible to teachers. Findings have not been expressed in ways that are comprehensible to teachers.
4. The education system itself is intractable and unable to change, or it is conversely inherently unstable, overly susceptive to fads, and consequently unable to engage in systematic change. (Kennedy, 1997, p. 4)

I will discuss only the first three reasons in my concluding remarks, with some slight changes in Kennedy's wording.

Our research is considered by many to be neither authoritative nor convincing. The reasons for this view go well beyond the scope of this presentation and pertain to educational research in general. But I think I have pointed to one basic reason why research in mathematics education is not convincing to some people: There are too many questions that cannot be answered by research, and the public does not understand that fact. Many of the questions being asked today relate to values and cannot be answered with research. Research results that do exist but that do not coincide with one's value system are often considered unauthoritative and

unconvincing. A major implication is that we need to do more to help parents, teachers, and policy makers understand the role of values in making decisions, and that we need to provide opportunities for reflection and discussion of what is valued. I suspect that many parents who want their children's education to mirror their own have not reflected carefully on the differences that exist in their world of work and what their children's world of work will look like, particularly in terms of the ubiquitous and constantly changing role of technology in today's and tomorrow's workplaces. What is the role of problem solving in their children's world? What types of problems will they encounter? What kinds of mathematical skills will they need? What new arenas of mathematics, arenas not even known to parents, are opening up and changing the nature of mathematics and of how mathematics is used? Is a procedure-driven curriculum sufficient for our children? *Research can be persuasive and authoritative only to the extent that people are fully aware of what they value, the reasons why they hold their values, and are open to considering evidence that supports or refutes those values.*

Many teachers and policy makers believe that most research has little relevance to the decisions they must make. I have tried here to point out only a few of the many research studies in mathematics education that offer sound principles for the practice of teaching mathematics. I want to remind this audience that not only research *findings* have relevance to the classroom. Many times the theoretical constructs that underlie the research or the tasks use in a research study can prove useful in practice. In fact, studies of research use showed that research was more likely to be used *conceptually* than *instrumentally*. That is, practitioners did not take from research tools that could be directly applied in their classrooms, but instead took ideas: concepts that could, especially when combined with other ideas and with their own experiences, help them understand their situations or help them invent specific responses to local situations. Even when teachers were trying to implement specific classroom innovations, we discovered that they did not *adopt* innovations, but instead adapted them. (Kennedy, 1997, p. 7)

Research can affect practice only if the research is accessible to teachers and policy makers. Unfortunately, research published in research journals is not written to be easily accessible to teachers, for good reason. Cronbach and Suppes said in 1969 that research is disciplined inquiry, that it is "inquiry conducted and reported in such a way that the argument can be painstakingly examined" (p. 15). This description of research reporting has not changed. The details that convince the reviewer that the research has been carefully undertaken and can be replicated are often the same details that bog down the general reader. I think much research is considered to be irrelevant simply because of this problem of accessibility. Some bridge is needed between research reports and the types of reports that allow authors to communicate with teachers and policy makers. As Kennedy (1997) has said, research must be not merely within physical reach of teachers but also within conceptual reach if it is to affect practice. In my work as an editor of a research journal, I have encouraged authors of papers I have accepted to rewrite their research reports for a more general audience and to submit them to journals where they will reach the practitioners. I am presently collecting many such rewritten articles into a book for teachers. I strongly advocate funding agencies to encourage researchers to find ways of reaching practitioner audiences with their research — not just their results, but their frameworks, their constructs, their tasks, and their models.

I conclude by quoting Bob Davis, a respected mathematician and mathematics educator who saw research and practice as inseparably linked.

> Ultimately, the two separate themes of designing learning experiences that meet the needs of students, and understanding more deeply what is involved in the way humans think about mathematics, may indeed be seen as intimately related. Indeed, it is hard to see how those involved in either enterprise can make an optimal contribution if they do not become allies and learn to work together in the closest possible way. (Davis, 1996, p. 298)

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TEACHERS' PROFESSIONAL DEVELOPMENT FOR VITAL MIDDLE SCHOOLS: WHAT DO WE KNOW AND WHERE SHOULD WE GO?

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Plenary Address

National Educational Research Policy and Priorities Board's Conference on Curriculum, Instruction, and Assessment in the Middle Grades: Linking Research and Practice

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Introduction: Lapsing into Clams

> "The wife, the clams...I mean maybe it's not the most exciting choice, but it works," the clam truck driver explained. "I wanted my own trucking business...I didn't want to drive for nobody else. I used to haul lots of things — other stuff. But it was complicated. When I saw I could make it with just the clams, it was easier. I kind of *lapsed* into clams, you might say." (Irving, 1999, p. 181)

John Irving's protagonist Eddie muses over this tortured analogy, encountered on a ferry ride in New England, and reflects that his own life is similar but not quite as bad as lapsing into clams. In this paper I will argue that we have also lapsed into constrained but easy thinking about how to make vital middle schools a reality through teacher development. This has occurred not because the specific goals are wrong, or even the short-term strategies, but because we have not considered all of the larger implications.

Over the last decade the challenges to educators, both from within and outside the profession, have been numerous and often conflicting. Much of the time the difficulties appear overwhelming, as schools are confronted with the seemingly endless challenges of changing demographics, a sense that student engagement and faith in edu-

cation is declining, and difficulty in attracting and retaining high quality faculty and administrators to work in an embattled professional setting. Yet this is a time when there are serious opportunities for reforming the existing system. Much energy has gone into a wide range of commission and research reports that delineate the problems and provide clear images of excellence. There is strong motivation to act on these reports at national, regional and local levels, and many countries — not only the U.S — are enacting educational reform efforts that demand improvement. Moreover, we are well past the stage of good intentions. A substantial batch of tools come in the form of well-documented, research-based staff development programs based on the "effective schools" and "effective teaching" programs, as well as other research-based efforts at major reform.

Much of what we know from research about how to change schools falls into a paradigm that might be best called *managed change*, whether it involves people, power, a planning process, or an organizational chart. The main focus of research and research-to-practice writing is on identifying factors that improve the probability that an innovation, such as reformed middle schools, will be successfully implemented and maintained, more or less as intended by an agreed upon vision. This paper will argue that we do know a lot about how to provide good professional development to support changes in schools for young adolescents. It will also argue that we have not yet put these pieces together in ways that sustain the broad changes that are demanded. While it is premature to come up with a solution that blends what we know about effective middle schools, effective staff development, and effective large-scale change, it is time to rethink how the puzzle should be approached.

What Do We Know? Some Pieces of the Research Puzzle

The ostensible purpose of this paper was to review the existing research on professional development in middle schools and to draw some conclusions about effective strategies. As I reviewed the published research, however, I was struck more by what we do not know, at least not for certain.

Middle Schools as Unique Contexts

The middle school movement is fueled by research on the argument that young adolescents profit by the development of integrated approaches to their social, emotional and intellectual needs. I am not a psychologist, and I will not examine this body of research with a critical eye, but take it largely for granted. As almost everyone interested in school reform knows, the best compilation of research-based thinking about middle school reform was summarized in the Carnegie Corporation's (1996) report on the topic. The principles outlined include:

- ★ Creating trusting, caring schools through smaller learning environments, teacher and student teaming, and personal adult advisement;
- ★ Encouraging critical thinking, healthy lifestyles, and active preparation for citizenship; and
- ★ Providing opportunities for all students to succeed by limiting rigid tracking, using cooperative, mixed ability instructional strategies, flexible scheduling and the use of out-of-school time to reinforce learning.

In order to accomplish these goals, a number of supportive conditions are recommended, including teacher and administrator empowerment, improved access to health services, and active parental and community involvement.

These are commendable recommendations, although it is hard to see why they are applicable only to students in the middle grades. But the middle school movement may be seen as largely a response to the pernicious development of junior high schools that, true to their name, operate as "high schools for short people" without acknowledging the need for guided transition from childhood into a more adult, independent status. Nevertheless, there is little systematic research that supports the contention that middle schools *must* be different because of developmental characteristics. To give just one example, Phillips (1997) finds that middle schools and high schools demonstrate the same pattern with respect to the relationship of "caring" and "pres-

sure to achieve" to student achievement results. Her results suggest that, as is the case in high schools, "caring" is not related to student achievement in mathematics, but "pressure" is related both to achievement and attendance. Hoy and Hannum (1997) also find that instruments developed to measure healthy school climates in high schools apply equally well to middle schools, while Lee and Smith (1993; 1995) find that in both middle and high schools, smaller learning communities and efforts to restructure are positively related to achievement. Similar findings occur for other aspects of the middle school reform agenda, such as the focus on teacher collaboration and teaming, and the significance of parental involvement.

This argument does not mean, of course, that there is no need for reform, or that middle schools do not have special characteristics. In many countries other than the U.S., there has been a renewed interest in changing education for young adolescents, under the assumption that it is an age group whose needs and curriculum have been long ignored. Getting there from a set of recommendations to changes in practice is not, however, simple. Although middle schools may be easier to change than high schools (Well and Oakes, 1996), the path is not smooth. Oakes, Vasudeva and Jones (1996) end an analysis of change in 16 middle schools with the following:

> Our findings imply that school reform movements such as *Turning Points* should include in their change some attention to the steps schools can take to develop a new culture and political environment, alongside a vision of new practices.... And professional development activities around reform should pay considerable attention to these aspects of reform, as well as to new organizational and pedagogical techniques...(p. 33)

Professional Development as a Component of School Reform

The call for "systemic reform" typically defined as higher, mandatory standards linked to new curricula and methods of assessing students' achievement of the standards — has dominated state agendas for over a decade. Bill Clinton, who chaired the National Governors' Council when it developed its position on standards-driven school reform, has made it a central feature of his educational policy efforts, assuring the continuing prominence of systemic reform. A recent manifestation of this line of policy development is the National Commission on Teaching, which translates the call for higher standards in K–12 schools to a similar, standards-based reform in teacher preparation and professional development programs (National Commission on Teaching and America's Future, 1996; see also Darling-Hammond, 1993 and Cohen, McLaughlin & Talbert, 1993). Scholars, major foundations, and policy makers have embraced systemic reform (See Resnick & Resnick, 1992).

The logic of this approach to professional development is that

(1) schools need to change because they are currently inadequate;

(2) change must be stimulated by widely agreed-upon standards, developed by the profession or by the profession in conjunction with scholarly collaborators;

(3) new standards demand development to bring teachers' beliefs and skills in line with emerging pedagogic demands; and

(4) development must be *professionalized*; that is, it must build capacity for change within and among teachers rather than rely on the transmission of knowledge from experts to passive teacher-consumers.

A large number of approaches to professional development emerged in conjunction with the systemic reform paradigm. Corcoran (1995), for example, identified a number of promising approaches, based on preliminary research evidence, such as teacher networks, school-university collaborations, professional development schools, and national board certification of teachers. These strategies, which continue to be explored in the research literature, not only have a shared goal of teacher learning, they also have in common, a focus on providing stimulation from outside the school for teacher learning.

Teacher networks are subject or project-based communication systems among teachers in many schools. The purpose of the networks is to engage teachers who have similar interests (e.g., mathematics, writing, pedagogy for middle grade adolescents, etc.) in temporary or semi-permanent collaboration to learn together (Lieberman & McLaughlin, 1992). The teacher network serves several functions: teachers serve as "critical friends" in a noncompetitive environment, the focus is on teacher-identified problems of practice, and teachers are working "to their passion" rather than to a pre-identified agenda (Hargreaves, 1997b).

School-university collaboration also involves temporary but often long-term, relationships between university faculty and teachers (Jacullo-Noto, 1984; Huberman, 1994). These relationships are formed around the mutual purpose of experimenting with curriculum and pedagogy, and involve elaborating and developing shared perspectives (Miller and O'Shea, 1996). The underlying assumption is that both educational researchers and teachers have a great deal to learn from each other, and that when they are engaged in the unusual activity of co-creation, they will both be more likely to change because they will be forced to challenge their own assumptions.

Professional Development Schools (PDSs) attempt to institutionalize the model of temporary collaboration between schools and universities (Levine & Trachtman, 1997). Collaboration goes beyond experimentation with a small group of teachers to the involvement of all teachers and university faculty as permanent and equal partners in pre-service teacher education, professional development, and R&D related to new curriculum and instructional strategies. In the early 1990s, the concept was endorsed as a model for creating adult learning and change by colleges of teacher education, such as the "Holmes Group" and also by national teacher associations. However, while there were some successful examples involving middle schools (see Dixon & Ishler, 1992 and Rafferty, 1996), the number was never large for two reasons. The first reason is the nature of state certification requirements for teacher licensure, which often do not specify a special license for middle school (see Dickinson & McEwin, 1997), and the second reason is costs of running a PDS. Most evaluations indicated that maintaining collaboration required more reallocation of effort than initially expected (Metcalf-Turner & Fischetti, 1996). *National Certification for Teachers* provides a strong external stimulus and a framework for teacher development for all grade levels (French, 1997; Ingvarson, 1998). While not mandatory and still controversial, the National Board for Professional Teaching Standards has developed both a rubric for measuring teacher expertise, and a portfolio-based process for obtaining recognition. More importantly for this paper, there are unique standards oriented to students of different ages, and five separate certificates are offered for teachers of young adolescents. A number of districts, particularly those that have promoted standards-based reform, have collaborated with universities to help experienced teachers understand and meet the goal of Board certification, and they have also provided financial incentives for doing so. In most districts, however, the relatively laborious process of becoming Board certified, coupled with the uncertain professional payoffs, have limited participation, although it is apparently growing. Middle school teachers appear to be over represented in some states among the Board certified teachers, and underrepresented in others. Out of 21 certificates, five deal with students between the ages of 11–15, which is defined as early adolescence. I randomly selected two states beginning with C (Colorado and Connecticut) and two with M (Minnesota and Massachusetts) from the lists published by the National Board on their website. Then I pooled the four states, and counted the number who were middle school certified. Overall, the proportion was 26%. These data, albeit very preliminary, suggest two things: first, the number of teachers participating from any given level is probably sensitive to state and local initiatives, and second, middle school teachers are no more likely than others to take advantage of the professional development opportunities offered by the National Board process.

National Board Certification in Four States

Certified	Number Certified	Middle School Certified	Percent M
Colorado	65	25	38%
Connecticut	34	12	35%
Massachusetts	71	11	15%
Minnesota	104	23	22%
TOTAL	**274**	**71**	**26%**

Professional Development as a Component of Teacher Improvement

Unlike the school reform movement's efforts to stimulate and support large-scale professional development, the focus of research on school improvement for the middle grades has emphasized a strategy of "one school at a time" or even "one teacher at a time." A fundamental assumption of professional development strategies that are grounded in school improvement is that the reasons that some schools don't get better are found in their internal conditions, which must be changed in order to promote better teaching and learning. This does not mean that external pressure and support are unimportant, but that "certified courses, inspirational speeches and isolated workshops are normally much less effective than professional learning that is at some point built into teachers' everyday working responsibilities" (Hargreaves, 1997, p. 117).

Most of the discussion of effective teacher improvement strategies thus emphasizes a combination of increased individual skills and knowledge, and the development of supportive school cultures and school leadership. In doing so, they often make an explicit or implicit response to Sarason's (1990, 1996) and Tyack and Tobin's (1994) concerns about the "culture of the school and the problem of change" — namely that schools cannot reform because of the unexamined attachment to a "grammar of schooling" that is based on non-democratic classroom and school cultures. (See Loucks-Horsley, 1995 and Hale, 1998 for a discussion of the importance of culture in professional development programs for middle schools.)

Nevertheless, there is solid support for a number of specific proposals for professional development strategies that can change teachers' cognitive models about content and pedagogy in middle school setting:

> *Enhancing skills and understanding through participation in materials and instructional design* serves a number of functions (Loucks-Horsely, 1995; Park & Coble, 1997). First, the need for experimental curriculum and instructional strategies in the rapidly evolving middle school setting virtually demands local invention. More importantly, it is argued that teachers who participate in curriculum development must, necessarily, learn more about content and "practical theories" of teaching. Teachers, it is argued, will also be more engaged in improving something that they have developed than in tinkering with materials that have been developed elsewhere. Note that this perspective rarely assumes that teachers are creating a whole curriculum from scratch.
>
> *Encouraging and providing opportunities for reflection* follows Schön's (1983) research on how professionals in practice learn best, and has been rapidly adopted among middle-school advocates (Fairbanks, 1995; Burk & Littleton, 1995; Swafford, Jones, Thorton, Stump & Miller, 1999). The assumption is that teachers must be more analytical about their own practice, including structured activities such as journaling, conducting pedagogical "applied experiments," and conducting post-hoc analyses of why classroom practice went well or did not (Taggert &

Wilson, 1998). The introduction of reflective practice is frequently assumed to require new skills and predisposition that can be taught, either in preservice education, or through professional development with experienced teachers. As an extension of reflective practice, some have advocated long-term "professional development profiles" that summarize where the teacher has been and is going.

Reflective practice implies self-awareness about what one does. It implies both self-critique and institutional critique as teachers work towards discoveries concerning their own learning and practice. By engaging in reflection teachers can become students of their craft as they puzzle about the assumptions basic to quality practice. Furthermore, commitment to reflection as a communal activity in which teachers engage suggests a public activity. Public conversation concerning the school and practice within the school may focus itself in four traditions as identified by Zeichner and Tabachnick (1991):

- ★ *Academic*: The focus of reflection is on representations of subject matter to students to promote understanding.
- ★ *Social Efficiency*: The focus of reflection is on the intelligent use of generic teaching strategies suggested by research on teaching.
- ★ *Developmentalist*: The focus of reflection is on the learning, development and understanding of students.
- ★ *Social Reconstructionist*: The focus of reflection is on the social conditions of schooling and issues of equity and justice.

Teacher-as-researcher is a formal extension of reflective practice, which is assumed, when learned, to be the status quo. Using the rubric of "action research" the model assumes that teachers (usually in small groups within schools) are trained in formal research methods, and use them in designing and assessing their own interventions in curriculum and pedagogy. New handbooks for teaching action research methods continue to emerge (Schmuck, 1997; McKernan, 1996; Stringer, 1999). The role of action research as a professional development tool has been used as a comprehensive model for improving education (Grimmett, 1996) and has generated its own journal *(Action in Teacher Education)*, but has often proven to be more difficult to implement as a tool for widespread change. Studies of action research efforts (Allen & Calhoun, 1998; King, 1997) do not always support the contention that teachers eagerly accept action research. Competing models of how to do action research, reluctance to share practice, and difficulty in moving from an intuitive model of reasoning to a data — based model are some of the problems encountered. Some concerns have also been raised about the ethics of action research in classrooms, at least in cases where teachers deliberately alter their "treatments" and gather data on them without oversight from a human subjects review committee.

Interdisciplinary Teaming originated with efforts to reform middle grades education, and is still largely confined to middle schools, although there has been an increasing adoption of transitional teams in the first year of high school (McKenna, 1989; Crockett, 1994; Pollack & Mills, 1997). While teacher teams are viewed as significant ways of promoting reflective practice and experimentation, they are not without problems in schoolwide change programs. In three middle schools studied by Kruse & Louis (1997), teams were very important in providing support for change within the team. However, communication between teams was, in all three cases, problematic, which led to difficulties in coordinating curriculum, student management strategies, and had serious impacts on within-school staffing flexibility.

The Limits of Existing Approaches

As noted above, a significant limitation of existing research is the lack of robust data related to the need for unique environments for students of this age group. Another limitation is the general ambivalence among policy makers about the wisdom of treating students of this age group differently — an ambivalence that is shared by many parents. Our approach to children of this age is both socially constructed and paradoxical. The social and

emotional needs of young adolescents are, of course, not a fixed developmental characteristic but are largely determined by the social structures and expectations developed by adults. We in the U.S. assume, for example, that it is natural for children of this age to turn away from their parents and engage with their peer groups because of "raging hormones" combined with the need to develop a differentiated identity — but in other societies the social expectation is that children will simply enlarge their social and emotional support system to include additional important adults. In the U.S., family vacations become shorter as children move into this period, under the assumption that parents and children will have less in common; in many European countries, however, parents and children maintain or even increase the pattern of spending three to four happy weeks together as a means of renewing family ties after the business of the school and work year. As Andy Hargreaves (1997) has noted, in North America it is a time when parents simultaneously cry out for zero tolerance of violence in schools, but assume that it is acceptable to buy Mortal Kombat for their 11-year olds.

Research on professional development in middle school contexts has been developing rapidly in the past few years, but is still relatively weak in producing unique conclusions. Middle schools are, for example, largely ignored in most of the large-scale empirical research on school reform. In the studies of the Chicago school reform they are ignored because they are part of K–8 structures, although they operate substantially separately. In the national databases, such as NELS, most analyses are confined to upper secondary schools. The international studies of math and science achievement pay equal attention to middle schools, but contain virtually no information about professional development strategies that might help to account for noted differences. While a number of good published case studies of reforming middle schools are emerging (Newman, 1997; Louis and Kruse, 1998; Oakes, Quartz, Ryan and Lipton, 2000), the first extended set of (commercially available) cases that treats middle school reform as a unique issue is Oakes, et al., op cit. The latter is, however, hardly a simple primer for "how to do it right" but, rather, a sympathetic account of how the middle schools in their study struggled to achieve the vision when surrounded by cultural and organizational contradictions. Particularly telling is the limited exposure that the schools in the study had to professional development that even remotely resembled the middle school standards developed by the National Staff Development Council (NSDC) (1994).

Even more importantly, we don't know very much about what staff development should consist of in the middle school. NSDC's guide to staff development for middle schools contains no references to processes of change and development that give clues to the unique characteristics and challenges facing them; when it comes to content, there is excellent and practical work on early adolescent development, some on curriculum, parent/community involvement, service learning and advisement, but much less on specific pedagogic strategies for young adolescents. Much of the research on instruction and assessment is still discipline-based, in spite of the fundamental assumption that middle school curriculum should be multi-or inter-disciplinary. On the question of teaming — a core feature of the proposed restructuring of middle schools — research is contradictory, with some studies finding positive effects on students and teachers (much of which is published by the National Middle School Association), while others observed more mixed results (Kruse and Louis, 1995; Oakes, et al., 2000).

Another problem revealed by recent research is that while visions of schools may have broadened and deepened, what teachers expect from professional development has changed only slightly. Haslam's (1999) report on the implementation of professional development in New American Schools projects describes how the NAS models challenge teachers to take on new roles. They are encouraged to become facilitators who can develop the potential of individual students and they are expected to play the role of boundary spanners between school, home, and community. They are asked to develop curricula with enhanced subject matter expertise, and to work in teams and through networks. Participating teachers, on the other hand, want pragmatic, immediately useable information. Haslam notes that "activities that do not have concrete examples and experiences are seen as less helpful.... veteran teachers can provide explanations of 'nuts and bolts' instructional issues" (p. 4-5). Furthermore, they also want trainers who have the same background as they do, a significant constraint if the

goal is to foster networking and interdisciplinary approaches to new teaching. Finally, he points out that principals in the NAS schools have a limited understanding of how their roles need to be changed or even transformed if these major changes are to take effect. Haslam sees the enterprise through a lens of the enthusiasm for the task that teachers report, although he notes that "schools rarely fully understand the meaning of whole school change..." (p. 10). On the other hand, he also sees a short-term focus on what Huberman (1984) calls "recipes for busy kitchens" in which time-pressed teachers want to implement major changes quickly with inadequate new ingredients.

The limitation draws attention to another issue that arises in most of the literature on professional development and middle schools: the need for reallocation of resources (Miles and Darling-Hammond, 1998). American secondary school teachers have high workloads in terms of number of student contact hours, compared to teachers in other developed countries (OECD Yearbook, 1997). In addition, most whole-school reform efforts, such as moving toward a true middle-school model, are planned with only limited additional resources for professional development (Haslam, 1999; Oakes, et al., 2000), and states, in general, have no consistent policies related to funding for teacher professional development (St. John, Ward, and Laine, 1999). While it is clearly possible to change teacher workloads and the use of time without greatly increasing the costs of education (the much-discussed example of Central Park East Secondary School (CPESS) is an example in which teacher-pupil loads were as low as 36 in the middle grades), this involves thinking far outside of the current box of block scheduling and teaming. For example, CPESS eliminated all non-teaching positions from its professional staff, and used non-certified instructors to cover some service learning activities, in addition to eliminating traditional subject-matter specialization (Miles and Darling-Hammond; Newman, 1997). Oakes, et al. (2000) report that the middle schools in their study consistently struggled with public perceptions that significant structural changes of this type "watered down" educational standards and provided inferior education, particularly from more involved and ambitious parents.

A New Map: Approaching "The Problem" from an Organizational Perspective

The very cursory review presented above does not, of course, take account of the complexities that are acknowledged by all parties involved in the change process — whether program developers, researchers or educational practitioners. If Bob Slavin were reading this, his first response would be "So, what's new?" And, my response would be, "Well Bob, its not the ideas, its how you put them together — and you could have told me that too!" I do not yet have an answer or a model, but will articulate below some of the elements that need to be considered as we move forward with the essential task of thinking about how to support teachers in creating effective middle schools.

Beyond "Managed Change" and "Teacher Professionalism" in Staff Development

Two images of how middle school staff development will support the proposed changes of *Turning Points* dominate most of the writing on the topic. On the one hand, the school reform literature typically adopts an image of 'managed change' in which it is assumed that staff development content and process will follow logically from the central reform policies — if adequate guidance is provided (St. John, et al., 1999). The NSDC standards are organized, for example, around the core recommendations of Turning Points, implying that professional development is in service of implementing this vision. To expand further, classic and more recent writings on school improvement emphasize the need for leaders to maintain at least an oversight role throughout the change process, which involves initiating careful, preferably data-driven problem analysis, a careful choice of solutions, the development of explicit implementation plans, and active monitoring of implementation (Eastwood and Louis, 1992). In each case, the role of staff development is seen largely in a context of supporting a change with known parameters (Louis, 1994).

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The image of "managed change" as an effective strategy for school improvement has been explicitly challenged not only by critical theorists but also by recent empirical research on school improvement that falls outside of a critical theory framework. In particular, studies of restructuring schools raise questions about the degree to which the traditional ways of thinking about change management apply to major transformation efforts.

Elsewhere, colleagues and I have argued that our current models for school improvement are incomplete (Voogt, Lagerweij & Louis, 1997). They rely too heavily on the "managed change" assumption, which assumes that policy makers, administrators, teachers, and parents are striving toward the same ends using roughly the same means. This assumption has been challenged by a number of important writers on organizational change based on research in the business sector. Mintzberg (1994) described The Rise and the Fall of Strategic Planning; Beer, Eisenstadt & Spector (1990) formulated the problem as "Why Change Programs Don't Produce Change"; and Morgan & Zohar (1997) assert that an individual's direct leverage over work results is limited to 15%.

Reform and Improvement — Choices for Middle Schools or a "Wicked Problem"?

Much of the rhetoric of school reform and school improvement literature assumes that policy makers and practitioners who seek a "new vision" for young adolescents are facing practical problems of making good choices and then "sticking to the knitting" during a phase of experimentation and implementation. I, on the other hand, would argue that the efforts to tie professional development and middle school reform into a relatively neat prescription for change constitute a "wicked problem" for which there are no easy choices and no clear prescriptions. Whenever schools tackle one set of issues facing middle school reform, they face a new, and often competing set of pressures that make the problem of change more and not less difficult. For example, the current systemic and/or comprehensive reform movement makes a number of assumptions that are critical for middle school practitioners:

- There are well developed, research-based models for middle schools that can be implemented, with modest adaptation, in other contexts.
- Professional development should be focused around key implementation issues for the specific model and vision for middle grades education.
- Teacher professionalism and commitment will be enhanced primarily by deepening specific knowledge and skills in line with the *Turning Points* recommendations.
- Assuming adequate leadership and parental support in the school and district, implementation will be time-consuming and difficult, but measurable and linear.
- Reform usually implies additional resources, either as a "lump" in the regular budget or through subsidized external support.

The improvement models, on the other hand, imply a different but equally reasonable set of assumptions:

- *Turning Points* does not provide a "blueprint" for a good middle school, but a guiding list of concepts — some of which have a weak or poorly articulated research base.
- Professional development needs to focus on developing teachers' analytical skills and judgment, focused on problems of practice that are visible and directly affect their work.
- Teachers' professionalism and commitment will be enhanced by increasing the resources that are available for reflection, development and co-creation with colleagues, and experimentation stimulated by the basic framework of *Turning Points*.
- Implementation will be time consuming and lengthy, but will be, at best, modestly organized. It will be affected — and sometimes even deflected — by local change and development, unanticipated changes in external policies and internal changes.

- ★ Change will not necessarily involve significant additional resources — assuming adequate current funding — and will be largely funded by internal reallocation within the school and district.

The reform model and the improvement model have an uneasy co-existence in the lives of most practitioners, who are subjected to state and local policies that incorporate both images without reconciling their differences (Louis, 1998). Yet, it is unlikely that the policy environment will change sufficiently or that a simpler or more coherent reality will emerge.

In other words, middle schools, as well as developers and trainers who are working with middle schools, have little choice: they must learn to live with anomalies and incompatible expectations. External systemic demands and internal developmental needs will not be reconciled, at least not in the foreseeable future.

What are the Elements of Change in Professional Practice in Middle Schools?

Based on the above analysis, middle school development is a result of a variety of influences, each of which will affect the kind of professional development that is most appropriate. These include:

- ★ An autonomous developmental process (organizational life cycles) including the acknowledged but unplanned for enormous increase in new teachers in most systems due to retirements;
- ★ Deliberately directed attempts (from within and from outside) to bring about educational and organizational changes; and
- ★ Unanticipated events or "normal crises", both positive and negative, such as leadership turnover and changes in state policy that must be factored into the development process.

This set of factors, in which non-planned change dominates all planned change processes, leads to the following conclusion: Effective *middle school development is an ongoing process in which the simultaneous effects of autonomous, coincidental, and deliberately directed changes that affect the functioning of schools converge. Every professional development program must be attuned to the developmental issues facing the school.*

The vision may guide choices of middle school professional development programs, but many other factors will affect appropriate choices. This conclusion is reflected in one recent but relatively obscure synthesis of what is known about effective staff development. Gall & Vojtek (1994) identify six research-based models for staff development that are prominent in practice: expert presenter, clinical supervision, skill training, action research, organization development, and change process. They argue that schools should not choose a model, and that there is no evidence that one is overwhelmingly more effective than another. Further, they argue that most existing syntheses "do not take into account the possibility that different [staff development] program characteristics may be effective for different staff development objectives" (p 41). Instead, they propose a contingency approach, in which the needs of the school are matched to the strengths of the professional development model.

The implication is, of course, that most schools will need to blend models in a continuously evolving effort to provide support for a vision that is also evolving based on school's current conditions. This matching process is not a science but the art of adjusting action to the combined influence of autonomous, planned and unplanned changes within the school and its context. This little booklet is, by far, the most sensible approach to staff development for the complex and "wicked problems" facing middle schools, whether they are implementing a comprehensive change model or are relying on a locally developed plan.

Where Are We Going? Tools for the Journey

Mental Models — Not Techniques

Recent research on the use of service learning indicates that teachers' beliefs about what constitutes appropriate teaching and teacher and student roles strongly predict whether they will be frequent users of service learning strategies in their own classrooms (Toole, 2000). The beliefs/mental models that are particularly relevant to middle grades education are: learning as constructed; learning as self-regulated; learning as contextual; and learning as social. While most teachers who have been exposed to middle school models in professional development settings are aware of what is expected of them and can articulate these concepts, they are still torn between their belief in structure and order and the newer constructivist models. In other words, skills in concrete classroom practices (such as cooperative learning) do not necessarily translate into a persistent effort by teachers to organize their work in new ways.

The issue then, for professional development is to move beyond knowledge and skills that are appropriate for implementing *Turning Points* to the larger issue of creating fundamental dispositions to teach and work in new ways. Changing hearts requires more effort, and a different kind of effort, than changing minds.

Professional Community within Schools

An increasing body of research suggests that real change in schools requires the development of strong professional communities (Little, 1993; Kruse, Louis & Bryk, 1995). This element is acknowledged in many of the professional development strategies discussed above under the section dealing with reform, but its centrality is debated. Data from a national study of reforming schools and a large data base from the Chicago Public Schools indicate that professional community within schools is a vital component of change in the directions that are advocated by *Turning Points* (Marks & Louis, 1998; Bryk, Camburn & Louis, 1999). Yet, as noted in many studies of school change, little attention is given to creating organizational conditions that will promote teachers' grappling together with the knotty problems of how to create new models of schooling. The rarely present but minimal conditions include regular and extended time for teachers to meet and talk, meaningful feedback on teaching performance from peers and administrators, supportive and demanding leadership, and professional development models that include the whole staff, working together on common problems over a sustained period of time. Most school staffs are cooperative, but not genuinely collaborative. If low professional community is the problem, professional development is only one part of the solution, albeit an important one. Professional development does not, by itself, lead directly to improved teaching unless the overall organizational conditions promote risk-taking and collective responsibility for student success.

Leading from the Center

There is no study of school improvement and reform that does not highlight the importance of school leadership. Yet, in virtually all of the discussions of professional development the importance of creating teacher-principal teams and of providing parallel professional development for administrators is ignored. Teachers and principals do not operate in parallel universes, although our treatment of professional development often assumes that their work overlaps only marginally. Middle school visions that "take" must go beyond the fundamental assumption of "managed change" that administrators help to guide decisions about professional development programs and recruit and evaluate their effectiveness (see Gall and Vojtek, 1994, p. 41) or the "professional teacher" model that too often assumes that administrators pay the bills and make sure the light bulbs are changed, but do not contribute to effective classrooms. Instead, the needs of school leaders and their central role in encouraging and creating standards for school development must be part of a professional development model.

Preparing for the Trip: Logistics or Evolutionary Planning?

The image of educational change embodied in my book (with Matt Miles) on urban high school reform (Louis & Miles, 1990) is that of a long journey with only a primitive map and an explorer's willingness to alter planned routes as new information becomes available. The goal does not change, but the itinerary does. I would argue that the road to effective middle schools must be thought of in the same way, only adding that the explorers need an important tool — professional development. In order to achieve this transformation toward the Turning Points vision of middle grades education, schools must address not only the need for new skills and knowledge, but also their embedded dysfunctional learning habits. The recent history of educational reform in the U.S. is littered with rapid "in-and-out" innovations that prevent real learning, and with the circulation of poor but popular ideas. Some of these result from the paucity of the R&D base that is readily available to schools and the relative isolation of knowledge production units (universities) from the knowledge application units (schools) — issues that are addressed in current professional development models. But some also result from patterns that are unrelated to the lack of useable information. One is the over-dependence of many systems on "quick fix" solutions from outside experts: last year a new instructional model that is touted to fix all reading problems, this year an emphasis on "total quality management," and next year an "outcomes based education" model. Educators accept outside pressure to implement and "show results" in unreasonably short time frames, rather than argue that rapid measurable change in children as a consequence of changes that affect a small percentage of the child's life are unreasonable. Unless middle schools recognize these bad habits, restructuring to provide more opportunities for good professional development will be ineffective.

The implications of the above analysis can be briefly summarized:

- The middle school vision will continue to evolve in highly politicized settings in which external and internal demands will shift and will sometimes be incompatible.
- Teacher change and school reform strategies for professional development tend to proceed from different assumptions, but both should be incorporated into our thinking about professional development for middle schools.
- Our knowledge about effective staff development strategies to promote effective middle schools is just beginning to emerge — we know enough to set out on the journey, but not enough to develop simple plans for how to do it right.
- Changing teachers' beliefs, knowledge and skills is central and difficult — but it is not enough. Attending to professional development without considering the context of organizational and leadership cultures, and vice-versa, is likely to result in superficial change.

To return to the laconic truck driver's dilemma with which I began this paper, it is time to move out of the clam business, and into the more challenging and uncertain (but rewarding) work of thinking about how best to support the evolutionary development of exciting learning environments for teachers, administrators, and students.

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APPENDIX A

Presenter Biographies

Dr. Donna E. Alvermann is Research Professor of Reading Education at the University of Georgia. Her research focuses on adolescent literacy. Currently, she is completing data collection on a Spencer Foundation major grant that includes a 15-week intervention aimed at teaching media literacy to a group of 30 middle and high school students. From 1992-1997, Dr. Alvermann co-directed the National Reading Research Center and conducted 3 long-term studies of adolescents' perceptions of reading and learning from text-based discussions. Prior to that, the literature on adolescent literacy development contained very little information on what it means to be motivated, or even disinterested, reader from an adolescent's perspective. This perspective is important because teachers generally tend to act more readily upon students' perceptions than they do upon the research and theorizing of those of us in the academy. Dr. Alvermann is past president of the National Reading Conference and served as co-chair of the International Reading Association's Commission on Adolescent Literacy from 1997-2000. Currently, she is a member of the Board of Directors of the College Reading Association, the Chair of the Board of Directors of the American Reading Forum, and a co-editor of the *Journal of Literacy Research*. In 1997, she was awarded the Oscar C. Causey Award for Outstanding Contributions to Reading Research.

Nancy Ames is Vice President and Director of Family, School and Community Programs at Education Development Center, Inc. Ms. Ames coordinates the National Forum to Accelerate Middle Grades Reform, whose goal is to make high performing middle grades schools the norm in this country, not the exception. She is also the principal investigator for "ATLAS in the Middle: Taking AIM at Middle Grades Results," a 5-year research and demonstration project funded by OERI to develop, test and disseminate a comprehensive school reform model. For several years, Ms. Ames provided technical assistance to the 16 urban school systems participating in the Lilly Endowment's Middle Grades Improvement Program in Indiana. She co-authored with Edward Miller, *Changing Middle Schools: How to Make Schools Work for Young Adolescents*, which highlights four urban middle schools that underwent deep transformation, as well as several articles on middle grades education, and helped plan the current conference sponsored by the National Educational Research Policy and Priorities Board. Before joining EDC, she spent 13 years as a senior researcher at ABT Associates Inc., where she conducted policy research on a variety of educational and justice issues.

Nancie Atwell is best known as the author of the language arts classic *In the Middle*, which was published in a second edition in 1998. She teaches seventh and eighth grade writing, reading, and history at the Center for Teaching and Learning, a K-8 demonstration school in Edgecomb, Maine. Nancie was the first classroom teacher to receive the NCTE David H. Russell Award and the MLA Mina P. Shaughnessy Prize for distinguished research in the teaching of English. She is also the author of *Side by Side: Essays on Teaching to Learn* (Heinemann, 1991) and numerous articles. Nancie is the editor of *Coming to Know: Writing to Learn in the Intermediate Grades* (Heinemann, 1990), as well as the first three volumes in Heinemann's Workshop series (1989, 1990, 1991).

Dr. Diane Briars is currently Mathematics Director for the Pittsburgh Public Schools and Co-Director of PRIME, the Pittsburgh Reform in Mathematics Education Project. She is responsible for all aspects of the K–12 mathematics program, including curriculum and assessment development, professional development, and the development of special programs. The major focus of current district work is implementation of standards-based instruction and assessment as called for in the NCTM Standards documents. Dr. Briars is also involved in national initiatives in mathematics education. She is a member of the National Commission on Mathematics and Science Teaching for the 21st Century, headed by former Senator John Glenn, a member of the Advisory Committee for the Education and Human Resources Directorate of the National Science Foundation, and is a

College Board Visiting Scholar for 2000-2001. She is a former Director of the National Council of Teachers of Mathematics and has served on a number of NCTM committees, most notably the writing groups for the NCTM *Assessment Standards for School Mathematics* (1999) and the *Curriculum and Evaluation Standards for School Mathematics* (1991). Dr. Briars is also active in other organizations including the College Board, (Trustee, member, and Chairperson of the Academic Advisory Committee and SAT Committee), the National Council of Supervisors of Mathematics and the Mathematical Science Educational Board of the National Research Council. She is the 1994 recipient of the Pennsylvania Council of Teachers of Mathematics Outstanding Mathematics Educator Award.

Dr. Nancy Clark-Chiarelli is a senior research associate at Education Development Center, Inc. who focuses her work on special education and literacy in the middle grades. She serves as methodologist and reading specialist on Beacons of Excellence, and guides the quantitative analysis of Beacons' survey data. She serves as methodology consultant to EDC's five-year REACH Institute, which is studying ways to support teaching for understanding in the content areas with students with disabilities in inclusive classrooms. She serves as the senior methodologist for EDC's work with the National Board for Professional Teaching Standards to develop the performance assessment for special education teachers. Dr. Clark-Chiarelli is co-founder of the Wheelock College Literacy Lab and was part of a multi-disciplinary assessment team in the Learning Disabilities Clinic at Children's Hospital, Boston. She was a special education teacher in the middle school and holds a doctorate from the Reading, Language, and Learning Disabilities Program at Harvard University.

Dr. Mary Beth Curtis is the founding director of the Center for Special Education at Lesley College. Before coming to Lesley in 1999, she was the founding director of the Boys Town Reading Center, where she oversaw the design and development of "Reading Is FAME", the Boys Town Reading Curriculum. After earning her Ph.D. in Psychology at the University of Pittsburgh, Mary Beth did postdoctoral work at the Learning Research and Development Center. She has also been an Associate Professor at Harvard's Graduate School of Education, and Associate Director of the Harvard Reading Laboratory.

Dr. Joan Ferrini-Mundy is Associate Dean for Science and Mathematics Education and Outreach in the College of Natural Science at Michigan State University. Her faculty appointments are in mathematics and teacher education. She holds a Ph.D. in mathematics education from the University of New Hampshire and was a faculty member in mathematics there from 1983-1991. Dr. Ferrini-Mundy taught mathematics at Mount Holyoke College in 1982–1983, where she co-founded the SummerMath for Teachers program. She served as a visiting scientist at the National Science Foundation, 1989-1991. She chaired the NCTM's Research Advisory Committee, was a member of the NCTM Board of Directors, and served on the Mathematical Sciences Education Board. Dr. Ferrini-Mundy has chaired the AERA Special Interest Group for Research in Mathematics Education. Her research interests are in calculus learning and mathematics education reform, K-14. She served as chair of the Writing Group for the revision of the NCTM Standards 2000, which were released April 2000.

Dr. James Fey is Professor of Curriculum & Instruction and Mathematics at the University of Maryland where he teaches content and methods courses for prospective teachers and graduate courses for doctoral students in mathematics education. His scholarship focuses on development, implementation, and assessment of innovative middle and high school curricula. Recent work has included roles as principal investigator on the Connected Mathematics and Core-Plus Mathematics Projects.

Dr. Susan Galletti has been the Vice-President of Middle Level Research and Development of the Galef Institute since May 1, 2000. In this role, Susan is leading the development of a middle grades comprehensive reform model, *Different Ways of Knowing*, including curriculum and professional development. Susan served as the NASSP Director of Middle Level Services for the National Association of Secondary School Principals (NASSP). In this position, Susan provided leadership, coordination and direction for products and services, including publications, conferences, the convention, and other staff development opportunities for middle level principal and assistant principal members. She has served as a middle school principal in the state of Washington for fourteen years, a staff development specialist for five years, and a middle school and junior high

school teacher. She has been involved in a number of change efforts as an educator, including changing three middle schools. Her efforts as an instructional leader have been cited in a number of publications, including *Crossing the Tracks* (Wheelock), *Women as School Executives: Realizing the Vision* (Texas Council of Women School Executives), and *Making School Reform Happen* (Bullard and Taylor). She has a Doctorate in Educational Administration from the University of Washington, where she was also involved as a Mentor Principal in the Danforth Education Administration Preparation program.

Dr. Kenji Hakuta is chair of the National Educational Research Policy and Priorities Board and professor, School of Education, Stanford University. He holds a Ph.D. in experimental psychology from Harvard University. He has done extensive research and is the author of many publications on first and second language acquisition and cognitive development and bilingualism.

Sharonica Hardin is a fourth year Literature teacher at Compton-Drew Investigative Learning Center Middle School. Currently, she serves as team leader for the 6th grade team. As a teacher, she tries to lead by example, as she says, "by demonstrating self-control, responsibility, dedication, persistence, and positive relationships with others." She models the behaviors she wants to see in her students. These qualities are important for all people to possess, especially the youth. Striving to prepare individuals for a productive role in a democratic society is her daily goal and the leading force of her teaching practices in and out of the classroom. In addition to teaching she is enrolled in the St. Louis Educational Leadership Institute at St. Louis University. This program is designed to prepare educators for administrative positions in the St. Louis Public Schools. Ms. Hardin will receive her Master's degree in Education Administration in December of this year. She is looking forward to achieving one of her goals of becoming a middle school principal.

Stephanie Hirsh is Deputy Executive Director of the National Staff Development Council. In that role, she is responsible for policy development, coordination of staff development leadership councils, state education agency relations, and NSDC partnerships. She is currently convening a National Task Force to Revise the NSDC Professional Development Standards. Ms. Hirsh is a valued member of the National Forum to Accelerate Middle Grades Reform, where she chairs the Leadership Committee. She has written numerous articles and given many presentations on results-based professional development. She is also an active member of her local school board, where she helps translates theory and research into policy and practice.

Dr. Robert Jiménez is an associate professor at the University of Illinois at Urbana Champaign. He teaches courses on qualitative research methods, second language literacy, and bilingual education. Jiménez has conducted research on the literacy instruction and learning of bilingual Latina/o readers. He received the Albert J. Harris Research Award from the International Reading Association, the Arnold O. Beckman Research Award from the University of Illinois, and the Distinguished College Scholar Award from the College of Education at Illinois. He has published his work in several journals including the *American Educational Research Journal, Elementary School Journal, Reading Research Quarterly, The Reading Teacher* and the *Journal of Adolescent and Adult Literacy.*

Dr. Joseph Johnson is Director of District Support and Services at the Charles A. Dana Center at the University of Texas at Austin. The Dana Center is an organized research unit dedicated to strengthening excellence in academic achievement for all students in Texas public schools. Dr. Johnson organizes and directs studies of high-performing/high-poverty schools and districts. The lessons learned from these studies are used to shape technical assistance and other support efforts that are helping other Texas schools improve academic results. Dr. Johnson co-directs the Austin office of the U.S. Department of Education's Region 8 Comprehensive Regional Assistance Center (the STAR Center). He also provides oversight leadership to the Texas Center for

Accelerated Schools, the Texas AVID Center, the Texas Office for the Education of Homeless Children and Youth, the Texas HeadStart Collaboration Project, the Texas Education Improvement Network, and the AmeriCorps for Community Engagement and Education. Dr. Johnson is a member of the Independent Review Panel for the National Assessment of Federal Education Programs and the National Assessment of Title I. He has served as a consultant to several state departments of education and many school districts. Before coming to the Dana Center, Dr. Johnson was the Senior Director of the Division of Accelerated Instruction at the Texas Education Agency. Also, he served as a classroom teacher in San Diego, California. Dr. Johnson earned a Ph.D. in educational administration from the University of Texas at Austin's Cooperative Superintendency Program. He earned a Master of Arts in Education from San Diego State University and graduated Magna Cum Laude with a Bachelor of Science degree from the University of Wisconsin at Oshkosh. In 1987 Dr. Johnson received the Special Educator of the Year Award from the New Mexico Council for Exceptional Children. In 1993 and again in 2000, he received the Educator of the Year Award from the Texas Association of Compensatory Education. He is the author of numerous publications including a book recently released by the U.S. Department of Education entitled, *Hope for Urban Education: A Study of Nine Urban Elementary Schools.*

Gloria Ladson-Billings is a professor in the Department of Curriculum & Instruction at the University of Wisconsin-Madison and a Senior Fellow in Urban Education at the Annenberg Institute for School Reform at Brown University. Her research interests concern the relationship between culture and schooling, particularly successful teaching and learning for African American students. Her publications include, *The Dreamkeepers: Successful Teachers of African American Children*, the *Dictionary of Multicultural Education* (with Carl A. Grant), and numerous journal articles and book chapters. She is currently the editor of the Teaching, Learning, and Human Development section of the *American Educational Research Journal* and a member of several editorial boards including, *Urban Education*, *Educational Policy*, and *The Journal of Negro Education*. Ladson-Billings has won numerous awards for her scholarship including: the 1989–90 National Academy of Education Spencer Post-doctoral Fellowship; the Early Career Contribution Award (1995) of the Committee on the Role and Status of Minorities in the American Educational Research Association; the Palmer O. Johnson Award (1996) for the outstanding article appearing in an AERA sponsored publication; the Mary Ann Raywid Award (1997) from the Society of Professors of Education; and the H.I. Romnes Award (1998) for outstanding research potential from the University of Wisconsin-Madison.

Dr. Catherine Cobb Morocco designs research projects at Education Development Center that focus on how teachers and schools can support young adolescents in developing their reading and writing abilities. Close collaboration with teachers, students, and administrators is at the core of her work. She directs the Reach Institute, a five-year partnership between EDC, three universities, and several school districts, which is studying teaching for understanding in classrooms that include students with disabilities. EDC's literacy research strand within the institute is studying how students with diverse cultural and socio-economic backgrounds and academic abilities can understand challenging literature and express their understanding in persuasive writing. She also directs Beacons of Excellence, which is developing web-based and print case studies of three high performing and inclusive urban middle schools. Dr. Morocco helped to create ATLAS Communities and is a co-developer of an ATLAS Literacy Toolkit and Website that will reach teachers around the country. Dr. Morocco is author of *Writers at Work* and numerous articles and book chapters on writing instruction and professional development models that support school-wide literacy reform. She holds an Ed.D. in language and literature from Harvard University and has taught at the middle school, high school, and university levels.

Michelle Pedigo is the Principal of Barren County Middle School, one of four nationally recognized "Schools to Watch", and was Named Kentucky Middle School Principal of the Year 2000 and local "Woman of the Year." She has finished her fifth year in school administration at BCMS and is a former high school language arts teacher, yearbook advisor, and basketball coach. During her tenure, BCMS has also been recognized as a "Welcoming School," received the "ERNIE" Award from the Glasgow/Barren County Chamber of Commerce, the PEAK Award from the Kentucky School Boards Association, and has been named a "Mentorship School" by the Kentucky Department of Education. She has presented about "Schools to Watch" at the National Middle School

Association Conference, the National Association for Secondary School Principals Conference, National Association of Elementary School Principals Conference, and for the Kentucky Department of Education. She serves on the Kentucky Principal's Network Advisory Board and the Kentucky Forum to Accelerate Middle Grades Reform and does consulting work through the Kentucky Collaborative for Teaching and Learning, for the Galef Institute in Santa Monica, California, and with administrators of St. Louis Public Schools.

Colleen Peters arrived in a Sixth Grade Literature classroom at Compton-Drew Investigative Learning Center in 1997. Prior to that, she earned a second degree of B.S. in Education, tutored illiterate adults, stayed home with children, traded commodities for an investment firm, and worked in grain merchandizing for two different corporations after graduating with a B.A. in English. Since 1997 Colleen started work on a M.A in curriculum, began a Community Leadership Program for Teachers, continues spiritual development work, and tries to keep track of her husband and two teenage daughters.

Thomas A. Romberg is the Sears Roebuck Foundation–Bascom Professor in Education at the University of Wisconsin–Madison. From 1988 to 1996 he was Director of the National Center for Research in Mathematical Sciences Education and starting in 1996 he is the Director of the National Center for Improving Student Learning and Achievement in Mathematics and Science for the U.S. Department of Education. He is also the Principal Investigator on NSF-funded curriculum project, *Mathematics in Context, a Connected Curriculum for Grades 5-8*, and on the NSF funded Longitudinal/Cross Sectional Study of the Impact of Mathematics in Context on Student Mathematical Performance. Dr. Romberg has a long history of involvement with mathematics curriculum reform, including work in the 1960's with the School Mathematics Study Group, in the 1970's with Developing Mathematical Processes, and in the 1980's as chair of two commissions — School Mathematics: Options for the 1990's (U.S. Department of Education) and Curriculum and Evaluation Standards for School Mathematics (National Council of Teachers of Mathematics). He has served as chair of the Assessment Standards for School Mathematics (National Council of Teachers of Mathematics). His research has focused on three areas: (1) young children's learning of initial mathematical concepts (best reflected in the Journal of Research in Mathematics Education monograph, "Learning to Add and Subtract"); (2) methods of evaluating both students and programs (best reflected in the books *Toward Effective Schooling: The IGE Experience, Reforming Mathematics in America's Cities, Mathematics Assessment and Evaluation*, and *Reform in School Mathematics and Authentic Assessment*); and (3) an integration of research on teaching, curriculum, and student thinking (best reflected in the handbook chapters, "Research on Teaching and Learning Mathematics: Two Disciplines of Scientific Inquiry" and "Problematic Features of the School Mathematics Curriculum"). Finally, he is internationally well known for his study and involvement with mathematics curriculum reform efforts. He has had fellowships to both Australia and the U.S.S.R.; has examined current work in England, Australia, The Netherlands, the U.S.S.R., Sweden, Norway, Germany, Spain, Japan, and Venezuela, and is currently collaborating with scholars at the University of Utrecht.

Karen Seashore Louis is currently Director of the Center for Applied Research and Educational Improvement and Professor of Educational Policy and Administration at the University of Minnesota. Her research and teaching interests focus on educational reform, knowledge use in schools and universities, and educational institutions as workplaces. Her research in K-12 education has focused on school improvement, educational reform and knowledge use in schools. Recent publications address the development of teachers' work in schools, the role of the district in school reform, urban education, comparative educational reform policies, the changing role of the principalship, and organizational learning.

Dr. Judith Sowder is a Professor of Mathematical and Computer Sciences and Director of the Center for Research in Mathematics and Science Education at San Diego State University. She has focused much of her research on children's development of number sense and on the instructional effects of teachers' mathematical knowledge. She has published over 40 papers, 19 book chapters, and 3 books, all on topics of mathematics learning and teaching. Judy is currently working on a project to study the effects of early field experiences on how prospective elementary teachers view and learn from their mathematics courses, and is in the process of

establishing a Professional Development Institute, funded by Qualcomm, to offer certification and credentialing programs for teachers in San Diego. She has served on many national and international committees and advisory boards and as editor of the *Journal for Research in Mathematics Education*. She is now serving on the Board of Directors of the National Council of Teachers of Mathematics. She has directed numerous projects funded by NSF and OERI. Judy has received awards for teaching and research, and most recently she received the NCTM Lifetime Achievement Award.

Andrea Walker been an urban educator for more than 30 years. She has served as an elementary and middle school teacher of mathematics and communication arts, adult educator, and administrator. She is a certified assessor for aspiring principals in the Leadership Academy of Missouri, a member of the Steering Committee of the National Middle School Association, and a member of the Education Committee of the Academy of Science, St. Louis. Since 1993 she has been involved in a collaborative effort with universities and the St. Louis Science Center to implement Schools For Thought, an innovative, cognitively based model of instruction, to transform classrooms into dynamic learning communities. As a trained practitioner of Schools For Thought, she opened a school designed to model effective teacher and student behaviors that create environments to move students from novice to expert learners. Andrea L. Walker presently serves as the principal of the Compton-Drew Investigative Learning Center Middle School, St. Louis Public Schools, a premier magnet school with an emphasis on mathematics, science, and technology.

Dr. Belinda Williams is currently the Managing Director for Research and Development for the Center for Health, Achievement, Neighborhood, Growth and Ethnic Studies (CHANGES) at the University of Pennsylvania. Prior to accepting the University of Pennsylvania position, she held the positions of Senior Research and Development Specialist at the Northeast and Islands Regional Educational Laboratory at Brown University and Director of the Urban Education Project at Research for Better Schools. Dr. Williams received her doctorate in psychology from Rutgers University and has more than 25 years of experience studying the academic achievement patterns of culturally different and poor students in urban districts. Her research, recent work, and publications focus on the impact of cultural environments on the cognitive development and the academic achievement patterns of poor children. She is editor of the ASCD publication, *Closing the Achievement Gap: A Vision for Changing Beliefs and Practices.*

APPENDIX B

Resources

I. Publications

Alvermann, D. E., Phelps, S. F. (1998). *Content Reading and Literacy: Succeeding in Today's Diverse Classrooms.* Boston: Allyn and Bacon.

Ambrosini, M. & Morretta, T. M. (2000). *Practical Approaches for Teaching Reading and Writing in Middle School.* International Reading Association

Cohen, D.K. & Hill, H.C. (2000). Instructional Policy and Classroom Performance: The Mathematics Reform in California. *Teachers College Record, (102)* 2, 294-343.

Darling-Hammond, L. (1995). Changing conceptions of teaching and teacher development. *Teacher Education Quarterly, 22* (4), 9-26.

Elliot, P. & Garnett, C. "Mathematics Power for All." In C.A. Thornton & N.S. Bley, (Eds.), *Windows of Opportunity: Mathematics for Students with Special Needs,* (pp. 3-17). Reston, VA: National Council of Teachers of Mathematics, 1994.

Elmore, R.F. (1996). Getting to scale with good educational practice. *Harvard Educational Review, 66* (1), 1-26.

Glaser, R., & Silver, E.A. "Assessment, Testing, and Instruction: Retrospect and Prospect." In L. Darling-Hammond. (ed.), *Review of Research in Education,* pp.393-419. Washington, D.C.: American Education Research Association, 1994.

Goldsmith, L.T. & Kantrov, I. (2000). Evaluating Middle Grades Curricula for High Standards of Learning and Performance. *National Association of Secondary School Principals Bulletin, April,* 30-39.

Goudvis, A. & Harvey, S. (2000). *Strategies that Work: Teaching Comprehension to Enhance Understanding.* Stenhouse

Guskey, T.R. (2000). *Evaluating professional development.* Thousand Oaks, CA: Corwin Press, Inc.

Hiebert, J., & Behr, M. (1999). Relationships between research and the NCTM Standards. *Journal for Research in Mathematics Education, 30,* 3-19.

Keene, E. O., Zimmerman, S. (1997). *Mosaic of Thought: Teaching Comprehension in a Reader's Workshop.* Heinemann.

Kennedy, M.M. "The Relevance of Content in Inservice Teacher Education," presented at annual meeting of American Educational Research Association, San Diego, CA, April, 1998.

Louis, K.S., Marks, H.M., & Kruse, S. (1996). Teachers' professional communities in restructuring schools. *American Educational Research Journal, 33* (4), 757-800.

Middleton, J. A., & Spanias, P. A. (1999). Motivation for achievement in mathematics: Findings, generalizations, and criticisms of the research. *Journal for Research in Mathematics Education, 30*, 65-88.

Milbrey W. M., Oberman, I. (Eds.). (1996). *Teacher Learning: New Policies, New Practices.* New York: Teachers College Press.

Moore, D.W. (1996). Context for literacy in secondary schools. In D. J. Leu, C. K. Kinzer, & K. A. Hinchman (eds.), *Literacies for the 21st century: Research and practice* (45th Yearbook of the National Reading Conference, pp. 15-46). Chicago: National Reading Conference.

National Council of Teachers of Mathematics. (2000). *Principals and standards of school mathematics.* Reston, VA: Author.

National Foundation for the Improvement of Education. (1996). *Teachers take charge of their learning: Transforming Professional Development for Student Success.* Washington, DC: Author.

National Staff Development Council's Standards for Staff Development. (1994). *Middle Level Edition Study Guide.* Oxford, OH: Author.

Schmoker, M. (1996). *Results: The key to continuous school improvement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Solomon, M.Z. (ed.). (1999). *The Diagnostic Teacher.* New York: Teacher College Press.

Sykes, G. (1999). Make Subject Matter Count. *Journal of Staff Development*, Spring 1999, 50-51.

Wilson, M.W. & Berne, J. (1999). Teacher Learning and the Acquisition of Professional Knowledge: An Examination of Research on Contemporary Professional Development. *Review of Research in Education.* (24), 173-209.

II. Web Sites

The National Forum to Accelerate Middle Grades Reform - http:// www.mgforum.org

MiddleWeb - http://www.middleweb.com

The National Middle School Association - http://www.nmsa.org

The National Association of Secondary School Principals - http://www.nassp.org/

The National Association of Elementary School Principals - http://www.naesp.org/

The National Writing Project - http://www-gse.berkeley.edu/Research/NWP/nwp.html

International Reading Association - http://www.reading.org

National Council of Teachers of English (NCTE) - http://www.ncte.org

The National Council of Teachers of Mathematics (NCTM) - http://www.nctm.org

National Staff Development Council - http://www.nsdc.org

The National Commission on Teaching and America's Future -
http://www.tc.columbia.edu/~teachcomm

The K-12 Mathematics Curriculum Center - http://www.edc.org/mcc/

The Annenberg Institute for School Reform - http://www.aisr.brown.edu

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